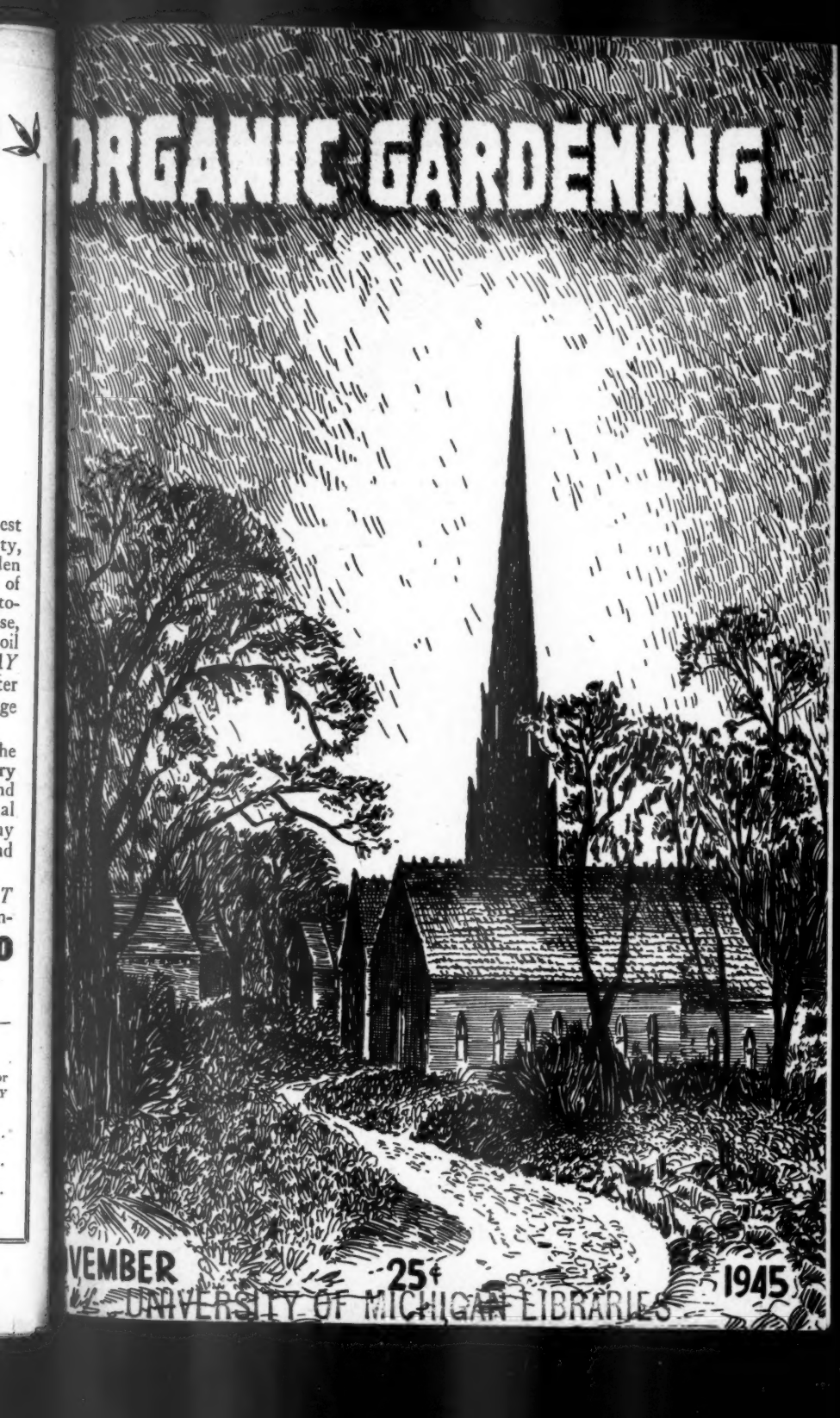


UNIVERSITY OF MICHIGAN LIBRARIES

ORGANIC GARDENING BOOKS

COMPOST — How To Make It

A pamphlet of 64 pages answering many questions about the best way to make compost. This book consists of material that has appeared in Organic Gardening from time to time. 25c

Natural Bread

A booklet of 48 pages which discusses the health-giving values of breads and cereals made with organically produced and stone-ground grains. Contains many recipes of bread, scones, breakfast cereals, unleavened breads, etc. 25c

Soil And Health

(3 Debates in the House of Lords)

A pamphlet of 55 pages which gives in complete form the two thrilling debates held in England on the advisability of forming a Royal Commission to check on the Sir Albert Howard method of farming and gardening. It is chockfull of amazing information and reads like a novel 25c

Vest-Pocket Vegetable Guide

By ROGER W. SMITH

A little booklet of 64 pages that discusses the growing of 40 vegetables in the organic manner. For medium northern climate. 25c

Vegetable Mould And Earthworms

By CHARLES DARWIN

This is a pamphlet which represents a condensed version of Darwin's famous classic on the earthworm. It contains the most important parts of his revolutionary work and is a MUST for every organic gardener and farmer. 25c

The Fruit Orchard

This book deals with the various aspects of Organic Orcharding; how to mulch, how to combat insects without sprays, what to consider about varieties, pollination, sports. Illustrated 25c

Questions & Answers on Compost

The How, When, What, and Why of Composting, covers all the aspects that our readers have faced in several years. A veritable cyclopedia! 25c

Leaves And What They Do

Over 20 illustrations. A true encyclopedia of the leaf, the source of all organic substance. Invaluable for the gardener and lover of plants: Leaf Color, wilting leaf, reactions to light and water, insect-eating leaves, leaf mold, acidity, medicinal and culinary qualities, etc. A handy reference book. 25c

Animals And The Gardener

By RICHARD HEADSTROM

The charming discussion of the gardener's animal friends and enemies, well illustrated, written by the prominent New England lecturer and teacher. 25c

Sunflower Seed—The Miracle Food

By J. I. RODALE

A wonderful survey of what sunflower seed does to the human body. Amply illustrated, dramatically written, full of unusual information, supported by experiment and experience. 25c

Luther Burbank

By Roger W. Smith

A lucidly written, splendidly illustrated book on the great plant breeder. You will get a useful introduction into the wide realm of plant breeding by one who is himself a successful gardener and much-loved garden writer. 25c

Sleep And Rheumatism

By J. I. RODALE

Mr. Rodale, always interested in natural methods of obtaining health, has made a startling discovery regarding pressures we exert on parts of our body during sleep, which cause stubborn conditions of neuritis in the fingers, arms, shoulders and neck. Miraculous cures have been obtained by persons who have followed the simple rules explained in this book, which is also quoted by medical authority. 25c

EARTHWORMS — Their Intensive Propagation

By DR. THOMAS J. BARRETT,

an authority on the breeding of earthworms. $1.00

Plowman's Folly

BY EDWARD H. FAULKNER

While we do not quite agree with Mr. Faulkner's main theme we believe this to be a valuable book which should be read by everyone interested in organic farming and gardening. There is much interesting material in the book showing how to increase the humus content of soils. $1.00

Grow a Garden

By Dr. Ehrenfried Pfeiffer and Erika Riese

118 pages, illustrated, written from a practical background of many years of actual experience, give detailed information for growing each vegetable from the bio-dynamic point of view. A goldmine of information. $1.25

Bio-Dynamic Farming & Gardening

By Dr. Ehrenfried Pfeiffer

240 pages, clothbound. This authoritative book describes in full the biodynamic methods, it shows how to convert an ordinary into a bio-dynamic farm, discusses the soil as living, etc. $2.00

Humus. Origin, Chemical Composition and Importance in Nature

By SELMAN A. WAKSMAN

A 526 page TOME by one of the world's acknowledged authorities, professor of Soil microbiology at Rutgers University. $6.50

CANADA AND FOREIGN ADD 25c PER VOLUME (25c BOOKS—5c PER VOLUME)

ORGANIC GARDENING—Emmaus, Pa.

TABLE OF CONTENTS

Vol. 7, No. 6 | Nov., 1945

25c a copy | $2.00 a year

J. I. Rodale, Editor
Heinrich Meyer, Ph. D., Assistant Editor
Sir Albert Howard, C.I.E., M.A., Associate Editor

With The Editor—Gardening At The Seashore 2
Farming And Gardening For Health or Disease 4
Decorative Rock Mulches 7
Open Sesame 11
The Language of the Honeybees 13
A Reader's Letter 16
Tulip Bulbs And How To Grow Them 17
Fish And Nips 24
A Modern Herbal 27
Interesting Letters Department 29
The Fertility Of The Soil And Its Relationship To Dental Health 31
Results 33
Hints For The Victory Gardener 35
The American Spikenard 38
The Deep Roots Of Compost 41
Over The Fence 45
Artificial Insemination 49
Gardening In Modern China 51
Organic Farming Unawares 53
The Chicken-Dropping Pit 55
Farming Hand In Hand With Nature 58
Reader's Correspondence 59

Cover By Edgar T. Clewell, Allentown, Pa.

Read Magazine, Inc. Executive and Editorial offices, 6th and Minor Sts., Emmaus, Penna. Subscription rates 12 issues for $2.00. **ORGANIC GARDENING**, published 12 times a year by Read Magazine, Inc., 6th and Minor Sts., Emmaus, Penna. Entered as second class mail at the postoffice at Emmaus, Penna., under the act of March 3, 1879. Printed in U. S. A.

With The Editor

Gardening At The Seashore

DURING a recent visit to the seashore I was struck by the strong saturation of the atmosphere with the tang of salt. You could actually taste it. You could feel the salty dampness on wood and iron work. The question immediately suggested itself, does this atmospheric salt get into the soil to a serious extent and secondly, if that is the case, should seaweed be used as a fertilizer in such seacoast areas. Since seaweed is an ocean product, does it contain the seagoing elements which, if placed in such salt-saturated soils, would accentuate the salt nutrition of the soil?

There is no question that a goodly quantity of salt does get into the soil. Computations made in seashore areas of Holland showed that the soil received 120 pounds of salt per acre from the air each year. Sandy seacoast soils are very receptive to such substances. The coarse, sandy structure of the soil permits such salt to work its way down easily. The practical absence of earthworms in such areas indicates that salt is a strong substance.

If present in large amounts it acts as a poison. When the Romans overran Carthage they applied salt to the land to disqualify its use for agricultural purposes. The Germans, by permitting the ocean to inundate sections of the coast of Holland, ruined the land for crop-growing for about five years. Salt has been used to exterminate weeds. It has been employed to prevent butter from going rancid. In the olden days farmers used sea-water to, disinfect grain seed. The salt does this because of its power to kill living organisms. Salt upsets the biologic balance in the soil and a very heavy dose would prevent the breaking down of organic materials. Sodium (which is a part of salt i. e., sodium chloride) in large quantities is harmful to plants and has to be gotten rid of before crops will grow.

On the other hand there are some plants that thrive on salt. Cranberries yield most abundantly on beach or quartz-sand. Giant asparagus is attained by the use of salt and in salt sea-sands. In such an asparagus bed, the weeds are extremely sensitive to the salt but the asparagus seems to be able to take up almost any amount of it without any check in its growth or vigor. Recently a Wisconsin farmer (Nick Engel) obtained a U. S. patent on a "pre-salted celery plant" which he obtained by applying a thousand pounds of salt per acre. Whether food products so raised are healthful from a nutritional standpoint I do not profess to know. Some day, comparative vitamin tests no doubt will be made of such produce.

There is a subtle principle involved in seashore farming and gardening, and that is that there is all

the difference in the world between sea water and seaweed. If you take seawater and evaporate the water out of it, the remaining solid will consist of almost three-fourths common salt (sodium chloride). If all the water was evaporated out of the oceans, the remaining salt would make a solid bed 250 feet in height. On the other hand, and strange to say, seaweeds are not made up of much salt. The majority of them contain only a small fraction more salt than land plants. There are some species that contain practically no salt. Whereas seawater is very rich in salt (sodium chloride), seaweeds contain exceptional quantities of potassium chloride.

There can be no question that excessive quantities of salt are deleterious to growing plants. I have seen evergreens at the seashore whose roots had turned white due to such excess and they did not seem to thrive at all. At the Marlborough Blenheim at Atlantic City, in a recent hurricane, over six inches of sea sand was blown in and covered their fine lawns. Such lawns must receive liberal organic dressings to counteract such abuses. These hurricanes blow salt for many miles inland.

For many years it was thought that an abnormal growth of woody plants on seacoasts, which is characterized by the plants growing at an angle away from the sea, was due to the great force of sea gales. It has recently been discovered that this is not the case. It is the salt in the sea-spray which retards the growth on the sea-side and causes this phenomenon.

So we see that in sea-coast regions there is a factor that must be counteracted and we need not fear the use of seaweed in furnishing the organic matter with which to enrich the soil. Experience is replete with cases of islanders in ocean regions who lived extremely healthy lives surrounded by nothing but ocean conditions. Take the case of Tristan Da Cunha which was the locale for the story *Mutiny on the Bounty*. These islanders have a salty, sandy soil. They use seaweed extensively as a fertilizer. Their diet includes liberal amounts of fish, a sea product. Investigators report their health and teeth as exceptionally good.

If you use seaweed, be sure to let the rains leach out the salt that clings to its outer surfaces. Or hose it off thoroughly. If salt comes in contact with some vegetable plants it will affect them badly. If you live in a sea-coast area use large amounts of seaweed. It might improve conditions if you could secure organic materials that originate inland, for instance, peat humus from Michigan, phosphate rock from Tennessee, dolomite from Pennsylvania, ground limestone from Ohio, wood ashes from Canada, leaf mould from New York, etc., etc. But in their absence you are perfectly safe from a nutritional standpoint if you used nothing but seaweed as your plant source. Do not overlook animal matter, however. If you cannot obtain manure, use bone meal, dried blood, hoof and horn meal, or other animal products. Composts made of plant material only are not fully balanced. Animal matter contains hormones, bacteria and other activating substances.

There is one thing the seashore gardener and farmer can do to counteract the strong action of salt in the soil. Such cover crops as mustard, vetch, lupins, and rape, take salt out of the soil and act as sweetening agents. They should be grown in such areas.

J. I. RODALE.

Farming And Gardening For Health or Disease

By SIR ALBERT HOWARD, C. I. E.

WHAT is the place of farming and gardening in human affairs? We can best answer this question if we bear in mind what are the essentials needed by mankind. They are five in number and in order of importance are: air, water, *food,* warmth, and shelter. Without a supply of air life lasts but a few minutes; without water, a few days; without food the human body can exist on compensation for a very few weeks.

Our food is produced for the most part by farmers and gardeners. The essential things about this food are four: (1) it must be grown in fertile soil; that is to say, in soil well supplied with freshly prepared high-quality humus; (2) it must be fresh; (3) it must be properly cooked, and (4) its cost must be stabilized by the simple process of making it as cheap and as abundant as the natural processes by which it is created will permit. All these things begin to be possible once we increase and then maintain the efficiency of the earth's green carpet—the machinery furnished by Nature for producing all our food.

Let us pay a little attention to Nature's food factory and see how it works. Like most factories, it consists of power-driven machines which convert raw materials into finished articles. The sun provides the power for our food factory; the machines which use this energy are the green cells of the leaf; the gaseous raw materials—oxygen and carbon dioxide—come from the atmosphere, the soil supplies water and various dissolved substances. The power, the machinery, and the raw materials are therefore the gift of Providence and cost us nothing. In spite of all our science and all our inventions we have never been able and never will be able to devise anything so efficient as this natural food factory. All mankind can do to increase its efficiency are two simple things: (1) the provision of better varieties of crops which will make more of the sun's rays, and (2) the restoration and maintenance of the fertility of the soil which underlies the earth's green carpet, so that the earth can look after the supply of water and the things it carries in solution. The creation of better varieties of crops is mostly done by plant breeders who must possess a certain flair for this work if they are to succeed. The seedsman merchandizes the results of their efforts. This leaves to the farmer and gardener only one duty—the restoration and maintenance of the fertility of the thin covering of soil on the dry areas of the earth's crust. Farmers and gardeners are, therefore, the machine minders in a vast natural factory.

What is this soil fertility, how can it be restored and maintained, and how does it affect the quality and quantity of our food?

Soil fertility is the condition

which results from the operation of Nature's round, from the orderly revolution of the wheel of life, from the adoption and faithful execution of the first principle of agriculture—there must always be a perfect balance between the processes of growth and the processes of decay. The consequences of this condition are a living soil, abundant crops of good quality, and live stock which possess the bloom of health. The key to fertile soil and a prosperous agriculture is humus.

We can restore and maintain the fertility of our soil by copying the operations of Nature as seen in our roadside hedges and in any piece of woodland. To do this we must convert all our vegetable and animal wastes into humus. Nature in the wood or hedgerow does this on the surface of the ground. The vegetable and animal residues make an ideal mixture which is then broken down by moulds and microbes with the ultimate formation of sweet-smelling leaf mould (humus). Two things have to amalgamate to form this humus—the undecayed portions of the mixed wastes and the remains of the moulds and microbes which ferment these residues.

After humus is made on the surface of the ground it must be distributed. This is done in the wood and in the hedgerow by the earthworm which lives on dead vegetable matter and soil, and converts these into perfect plant food in the shape of its worm casts. These are many times richer in the raw materials needed by the crop than the surface soil. Besides this duty the worms are magnificent cultivators, turning the soil over and over and providing a perfect set of ventilating shafts by which the soil air can be kept fresh and by which the rainfall can soak into the subsoil.

Observe how Nature tries to help us to produce our food. We are given the perfect factory in full working order and including the raw materials. To maintain our soil in a fertile condition we are provided with object lessons galore of the way the perfect manure—humus—should be made and distributed.

But we have no room in our gardens or farms to copy exactly what Nature does in the hedgerows and in the woods. We can, however, achieve a similar result by the device of the compost heap in which the carpet of fermenting litter is rolled up with one layer above the next. We owe this device to the Chinese who, at an early stage in their history, discovered for themselves how to concentrate and speed up Nature's processes of decay and so save both space and time. Then, by feeding their soil with humus—the perfect food for plants—they save still more precious time which the soil would otherwise need for doing the work of the compost heap. They multiply the area of their land by at least four, not by stretching it, but by increasing its internal area—that of the pore spaces. In other words, they improve the tilth and deepen the layer of top soil used by the roots of crops. In the hands of John Chinaman one superficial acre has become equal to four acres; crop does not follow crop, but crops are always mixed so that one is always overlapping the other.

In our gardening and farming operations, therefore, we should follow the method which Nature has devised and copy the successful examples which have stood the test of time in China. Both give us the one thing we need in food production—sound and reliable direction.

A simple method, known as the Indore process, of making this indispensable humus in any garden or

on any farm is now in successful operation all over the world, and can be carried out anywhere.

What is the result of properly made humus on the plant, on our live stock, and on ourselves? This can be summed up in one word—health.

Let us first consider the crop. The response of the plant to freshly prepared humus is almost magical. Growth is increased; quality in the product is improved; resistance to insect, fungous and virus diseases is acquired. All this is very easily demonstrated on quick-growing salad crops like lettuces and radishes. Fill a cold frame in the early spring nearly to the glass with compost which is about three-quarters decayed. Such material will not have completely fermented and will therefore soon warm up after the frame is filled. Then sow a mixed crop of radishes and lettuces. The rate at which this mixture will develop, the quality of the produce, and its resistance to disease must be seen to be believed. At least four such crops can be raised before the winter, using the glass only to counteract the cold in the spring and late summer. Instead of two crops we can run a mixture of three or four and arrange our sowings so that the frame is always filled—one crop overlapping the other. In this way all the energy of sunlight is trapped and none of our power is lost. This method is now being adopted in many parts of the country. It has for centuries been the rule in the Far East. I saw it in England for the first time about 1936, in one of Mr. F. A. Secrett's gardens near London. He informed me he learned it from a Chinese market gardener near Melbourne while on a tour round the world in search of new ideas in vegetable growing.

The consequences of a fertile soil are not confined to the crop. They are duly passed on to the live stock. I know from long experience that animals like working oxen, fed with the fresh produce of fertile soil, are practically immune to such diseases as foot-and-mouth, tuberculosis, and Johne's disease. So it is with those races of mankind like the Hunzas which are nourished from land where Nature's law of return is faithfully obeyed. The many diseases of civilization simply do not occur there, as will be evident from the verdict of one of the pioneers in preventive medicine, General Sir Robert McCarrison.

The remarkable health of these people is one of the consequences of their agriculture, in which the law of return is scrupulously obeyed. All their vegetable, animal and human wastes are carefully returned to the soil of the irrigated terraces which produce the grain, fruit, and vegetables which feed them.

The real foundation of health is the fresh produce of a soil kept in good condition by the faithful adoption of Nature's law of return.

Decorative Rock Mulches

"HERBERT Clarence White, Chinese Art Exhibitions and Lectures, Gardena, Cal." reads the letterhead of our correspondent who sent in the splendid pictures of rock-mulched citrus trees. "I was very much interested in your June editorial on *Rock Mulches*", he writes. "In fact I have fallen for the idea like a ton of brick." This is not surprising in one acquainted with Far Eastern Art. For there, rock gardening has reached the highest peak of perfection.

Mr. White has experimented with mulches for nearly a year and when the rock mulch idea came to his attention he was both delighted and intrigued with the idea. "I immediately took all the rocks I had been gathering for the past year or two for an out-door fireplace, and put them around my citrus trees.

"The tree that I mulched first with rock—a young Sweet Lime, planted this spring—has shown more rapid growth than any of the other citrus trees on my little place. I took a picture of this young tree immediately after mulching on June 24th. The second picture was taken July 31st, or about 5 weeks later. During these five weeks the new growth has been phenomenal compared with the other trees that were not rock mulched—averaging from 12 to 15 inches.

"Another interesting result was observed on my new Armstrong Seedless Lemon tree. I planted this tree on April 15. While the other trees showed immediate signs of life, this tree did not develop a single new bud or leaf during 2½ months. I gave all my young trees equal care, and they were all mulched from the time of planting (April 15, 1945) with leaves or straw. Yet, up until July 1st there was not a sign of life or new growth on this 2-year Seedless Lemon. Then I rock-mulched this tree, and to my delight within one week new buds began to appear, and within four weeks after the application of the rock mulch, there has been new growth up to 10½ inches! Of course, these are but isolated cases. They do not prove anything, but to me they indicate a very definite benefit from the experiment. What do you think?

"I am enclosing some photographs of these young trees which may be of interest to you. I find that rock mulching adds very materially to the attractiveness of my city lot. As you suggested in your Editorial I have tried several interesting designs—diamonds, circles, etc."

Mr. White also sent in two pictures, taken in the proper scientific spirit of a test. These two trees were not mulched and showed no appreciable growth during the period in question. It appears therefore that rock mulches, combined with an organic mulch of straw or compost, can serve as moisture preservers and growth stimulators. True, sowbugs and ants may hide under the rocks too, but they usually do no damage to trees or can be otherwise handled.

Sweet Lime. Planted April 15, 1945. Rock-mulched June 25, 1945. Photo taken July 31, showing 15-inch growth in five weeks.

Bush type Meyer Lemon. Leaf Mulch under rocks prevents weed growth which otherwise would flourish between rocks.

Young Sweet Lime. Note outer wall of rock with dike to use in flooding area around tree.

Young Sweet Lime. 15½ inch growth after rock mulch was applied.

lings appeared, both of tobacco and sesame, and while the heavy summer rains retarded tomatoes and peppers, my tobacco and sesame grew beautifully, side by side. When the tobacco had to be transplanted on a bed that had been in peas, the sesame plants were already eight

inches high and strong as weeds. Before long the pale rose flowers appeared in the leaf axils; still the plants grew on, while the old flowers developed into hairy seed pods amply filled. At this writing, early in September, the sesame rivals the tobacco in height—about three and a half feet or more, and new flowers are yet appearing as I cut the tobacco flowers out on the adjoining bed. There is apparently no insect around that has found out about sesame: All plants are strong and vigorous, and when a heavy gust of wind bends some sunflowers down and even breaks some of the tallest plants reaching up some fourteen feet, sesame stands up firmly.

I had also planted some of the same original seed in a different spot on somewhat better ground, where lettuce had been, and found no difference. There sesame grows surrounded by Thunbergias. These show their dark and light ochre or white blossoms with the dark throat —a plant that in the South develops into vigorous vines while here it remains more of a spreading herb. These sesame plants were sown two weeks after the first, around the middle of June. Apparently the light conditions, temperature and moisture differences do not affect sesame very much. The plants here are a bit smaller, but otherwise have gone through the same growth cycle as their older brothers on the subsoil bed.

We do not know yet whether we shall make candy or use the seeds for baking, but we know now that we can successfully raise this valuable plant in the latitude of Philadelphia, and, if the adverse spring and summer weather allows conclusions, we could probably grow it much farther North. Quite apart from the food value, sesame is a decorative plant and might even be carried among the flowers.

The Language of the Honeybees

By MYKOLA H. HAYDAK

Division of Entomology and Economic Zoology, University of Minnesota.

Paper No. 525, Miscellaneous Journal Series, Minnesota Agricultural Experiment Station, St. Paul.

THE life of the honeybee has attracted the attention of many beekeepers and investigators. It is not surprising: the whole organization of the bee community has been shrouded in mystery, the veil of which is gradually being lifted by the untiring efforts of numerous students of bee life.

In examining a colony of bees, beekeepers of the past encountered certain phenomena which seemed to them to be without meaning. So it is noted in one of the old European books on beekeeping that in 1823 a prominent beekeeper showed his friends dancing bees and "everybody enjoyed watching the bee ballet." They did not know that earlier in 1788 Father Spitzner had described these dances as a method by means of which bees communicate to the inmates of the hive regarding the volume of honeyflow and the place of the source of nectar. Spitzner's observation had fallen into oblivion until more than a century later when von Frisch published his famous observations "About the language of the bees." He unquestionably proved that the bees "tell each other" about the amount of the honeyflow but not about the location of the plants yielding nectar.

A bee that first discovers a rich source of nectar, after returning to the hive and disposing of her load, begins a special "ritual" dance which von Frisch named a "round dance." To quote his own words, the bee "with quick short steps runs around in narrow circles on the comb, often changing her direction so that she rushes once to the right, then to the left and again describes one or two circles in either direction." It may continue to "waltz" for several seconds or even as long as a minute; then she may stop and begin the dance at a different place on the comb. Finally she rushes toward the entrance and flies out again. The dance excites the bees, they follow "the performer," place their antennae (feelers) on the dancing bee, and leave the hive in search of the source of nectar.

A somewhat different dance is performed when a pollen gatherer returns to the hive. In this case the bee, before depositing the load, begins to dance on the comb making a narrow half-circle to one side, then executes a sharp turn and runs in a straight line to the starting point, then describes a half-circle in the opposite direction so that she completes a full circle with the first half-circle. Then the bee again runs in a straight line to the starting point. However, while running in a straight line, the bee performs wiggling motions with all her body —hence the name—"wiggle-tail dance." The inmates of the hive are excited by the dance and by the odor of pollen and fly out looking for the source. When observing bees dancing in the hive, one is impressed by the fact that there is no

sharp distinction between the "pollen dance" and "nectar dance." Out of several dozen of bees observed lately while taking movies at University Farm, only one pollen gatherer performed according to the books. The dance of the rest of them was rather a mixture of the two.

These two dances can be observed only during the active season when bees discover a rich source of nectar or pollen. However, there are some other dances which one can notice at any time during the year when appropriate conditions exist. Many beekeepers have observed in their apiaries, especially in the evening, bees performing a mass dance on the front wall of the hive. The bees stand firmly on the second and the third pair of legs, facing the entrance. The head is bent down and the front legs are bent also. The bees perform "rocking" or "washboard" movements swinging their bodies forward and backward. At the same time, with short and quick movements of the bent tarsi of the front legs, they scrape the surface of the hive and their mandibles, with a rapid shearing movement, slide over the surface as if cleaning the latter. The tips of the antennae touch the surface, moving constantly as if checking up on the work. After a while one can observe some material accumulated on the lower edge of the mandibles. Periodically the bees clean their mandibles as well as the tarsi of the front legs. Occasionally they move and continue their "dance" at another place. Careful investigations have shown that these rocking movements serve as a mechanical cleaning process by means of which the bees scrape and polish the surfaces of the hive. Usually this dance, both inside and outside of the hive, is performed by young bees, probably as a part of their duties in taking care of the hive. Such a dance by individual bees has been observed inside of a glass hive even during the winter, but it was always of short duration.

Occasionally a bee feels the need of being cleaned. In such cases it performs a special dance, consisting of a rapid stamping of the legs and a rhythmic swinging of the body to the sides. At the same time the bee rapidly raises and lowers the body and tries to clean around the bases of the wings with the middle pair of the legs. Such a "shaking" dance may be observed any time during the year, even during the winter. Usually the bee which is closest to the dancer touches the latter with its antennae and begins to clean the dancer. With the mandibles widely spread the "cleaner" touches the thorax of the dancer just under the base of the wings. As soon as the dancer feels the touch of the cleaner it stops dancing, slowly spreads out the wings of one side, bends the abdomen and curves the body to the side and somewhat upward as if accommodating the cleaner. The latter works very energetically. Its antennae are held close to the mandibles. With shearlike motions of the mandibles it cleans around the base of the wings. From time to time it stops, standing on the last two pairs of legs, the front pair being held in the air, and works with the mandibles as if chewing something that it found while cleaning, holding the antennae close to the tips of the mandibles. Then the cleaner continues her work, "clipping" with the mandibles over the scutum from the rear to the front, sometimes over the head, and in the grooves of the thorax; sometimes she climbs on the dancer, crawls to the other side and cleans under the opposite pair of wings and then

quits. If the dancer is satisfied with the work she cleans her tongue, antennae and the body in general and goes about her duties. In case the cleaning was not done well, the bee continues to dance, and either the same cleaner or another bee starts the process of cleaning all over again.

There is still another dance which is very difficult to interpret. Sometimes a bee places its front legs on some part of the body of another bee and then makes five or six shaking movements up and down with the abdomen, with a simultaneous slight swinging forward and backward. Then it crawls farther and performs such a dance touching another bee, then another and so on. Usually a number of such dancers can be observed during a quiet warm afternoon or evening after a good honeyflow in colonies where everything is normal. Sometimes one can see such a dance on a sealed queen cell. The writer observed last spring that when a virgin queen had just emerged from a cell in a queenless colony, a large number of bees started performing such a dance. This dance may be called a "joy dance," a "good-time dance" or a "dance of contentment," because it is done only when the conditions in the hive are at an optimum.

Another very interesting activity can be observed in a hive the meaning of which is not clear. It begins when one of the bees on the comb bends its head in a peculiar way. One or more neighboring bees become excited and immediately begin to investigate her using their antennae and front legs. They climb over and under her, pull the joints of the hind and middle legs, but mostly touch her sides from below with their antennae, mandibles and front legs, cleaning their antennae periodically. The bee which aroused so much attention has the mandibles wide open and the upper part of the tongue protruded as is the case with the nurse bees. The protruded part is entirely dry. The bee turns her head toward the "examining" bee as soon as the latter approaches the front part of her body. Then she unfolds the entire tongue, extends the second pair of legs as if sitting on the third pair and constantly cleans the tongue with her front legs. Sometimes the tongue becomes completely distorted, the tongue appendages spreading in various directions so that an impression is obtained that the bee has cramps of the tongue. At the same time the bees that started "the massage" frantically continue their treatment, sometimes pulling the "sick" bee by the mandibles or tongue, sometimes licking the latter. Several minutes later everything quiets down and the "sick" bee begins normally to clean its antennae, eyes, hind legs, wings, the tongue and then quietly crawls away. Such a phenomenon has been observed usually in the fall or during the winter and the same treatment was observed in early spring being given to chilled bees when they were placed on the entrance of their hive. What the meaning of this "massage" is, is anyone's guess.

This brief article brings together all the known facts about the ways in which honeybees communicate with each other. The author entertains the hope that it will be helpful to persons interested in interpreting some of the activities of bees. A beekeeper can learn much about nature if he not only lives from his bees but also lives "with them," spending some time in observing their ways of life during the various seasons of the year.

A Reader's Letter

WELL I feel I just must write and tell you about our Silver Prune tree. Brown rot had just about ruined it as a fruit tree. We had decided to cut it down. Last year the fruit was a total loss. We got 3 prunes off it. The rest were ruined with B. rot. Well here is what I did. I bought a rabbit and hutch and parked it under the prune tree. Hutch had wire floor so all urine and droppings went on the ground under the tree. Nothing was done to hasten composting. We just let nature take its own sweet time. We had a wonderful crop of fine sweet fruit this year and very little rot. It was such a rapid recovery I just had to tell you about it. The tree was loaded.

Our tomatoes are just fine this year so far no blossom end rot, though plenty last year. Beans producing heavy crops and not chewed to pieces with bugs like last year. I used a lot of compost and *plenty* of water. We have flea beetles, spotted beetles and so forth but everything is making such a tremendous growth the bugs can't seem to make much headway. We have *not* used any dust or spray of any kind this year. Have wonderful cabbage, cauliflower, beans, tomatoes and potatoes. We have poured the water on and things are sure responding. Our compost heaps are not neglected either.

Friend husband thinks people being sparing of water is the reason of much damage with the bugs, and seeing the results of plenty of water this year I am inclined to agree with him. When I read "Trampling Out The Vintage" I believe that plenty of water does have some controlling factor with the pests. Oh, yes, we have frogs in our garden and *hundreds* of birds. Too many varieties to name. I must mention the beautiful humming birds though. We have plenty of trees and brush for shelter and a bird bath. In the morning it is such fun to see all the feathered folk flock around for breakfast in the garden. Should we turn on the spray to water the garden, my how the birds chatter as they splash about in the spray. The humming birds fly in the spray turning and twisting about to be sure they get a good bath. How much these birds destroy of the pests. They sure account for a lot.

I guess I had better stop my chatter but I sure try to follow the compost way. Everyone who sees our garden asks how we do it. Oh, yes. Why can't you print signs to read as follows: "Organic Gardens Raised Here." Let those who are really earnest about it be recognized.

Doris Juttner,
Corvallis, Oregon.

Tulip Bulbs And How To Grow Them

By DR. EHRENFRIED E. PFEIFFER

TULIPS are reproduced for both bulbs and cut flowers; it is the bulbs which are the natural means of propagation. For a long time it was believed that only the Dutch people could grow bulbs successfully. However, in the last decade or so, tulip growing has successfully taken hold in the United States.

Why had the Dutch maintained their monopoly on bulbs for centuries? Can it be the moist climate; the nearness of the seacoast with its salty air; the sandy humus soil, the cool summers and mild winters? Or, is it the patience, skillful hand labor, a good sense for detail, the industriousness and perseverance for growing and developing new varieties? Probably it is all of these qualities plus a favorable environment. The Dutch have an innate sense for cleanliness and for flowers. Practically every farm house and city dwelling has a garden with blooming flowers.

Although the Dutch soil and climate is known to be favorable for growth, such as for sugar beets and potatoes, and for onions and pastures in areas that have clay soil, it is by no means typical for tulips, (in spite of the general belief). For wild tulips are native in Asia Minor, on the border of the Arabian desert, in Palestine, where they grow as small plants with small leaves and tiny bright red colored blossoms. The root bulbs plunge deeper from year to year and collect and preserve the little moisture offered from nature in the form of dew, with very little rain. High humidity is not present as in Holland where even the bed sheets always feel moist.

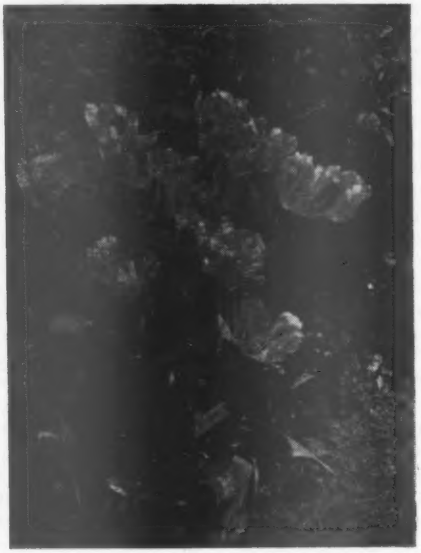
How has this wild desert plant become transformed into the big bulb of Holland? The story is comparable to that of the desert or range steer which is brought to the feeding yard in the corn belt to be fattened up. The Dutch bulb grower puts the bulbs through the same process, e. g., by giving the tulip all the nourishment it wants plus the favorable growing conditions of the Holland climate. Therefore, instead of one bulb the plant produces two, three, four, and sometimes more secondary bulbs, of the very large sized variety which are so popular with the buyers of bulbs. However, the smaller sizes are not discarded, but replanted again in order to grow into larger ones. As a matter of fact, all but the usual marketable sizes are replanted again and again until they produce large bulbs. It is understandable therefore, in order to save years of reproduction, that one uses a rich soil in order to secure a quick and bulky development.

It was believed that sandy soils were preferable, but it has been proven that the bulbs also thrive successfully on a clay soil. The writer has grown as many as 15 acres of tulips for bulbs on rather heavy soil with most satisfactory results,—namely, an average crop of 80% of the planted bulbs of highest grade marketable size plus all planting material returned and additional material for further

propagation. However, the main bulb producers in Holland live between The Hague and Haarlem, near Lisse, Sassenheim, e. g. the so-called "bollenstreek" which has sandy soil.

It is a beautiful sight to drive through the countryside in May and see the hundreds of acres of tulips of all shapes and colors in blossom. The "fields" are kept like long garden beds with small paths in between, free of all weeds. However, within just a few weeks time the picture changes. Yellow dried stems are dangling between the green leaves and piles of rotting blossoms are in the nearby fields. This is one of the "secrets" of bulb production; the tulip is not allowed to develop fruit or seed. Immediately after the blossoms have opened they are cut off at the top of the stem right underneath the bud, or rather underneath the receptacle.

This procedure retards the growth energy so that no more sap and plant food is directed upwards. The entire energy of the plant is reversed and the growth process of bulbs reinforced. The plant will now produce as many secondary bulbs as the natural conditions permit. The original planted bulb shrinks or decays whilst the secondary bulbs are the ones which are used for commercial purposes and for reproduction (multiplication). At the same time, the beds are carefully checked so that only the desired variety grows, as from this point on, with the blossom removed, it would not be possible to differentiate the bulbs. The "wrong" kind, with its bulb, is removed and destroyed. The cutting of the blossom and checking of variety

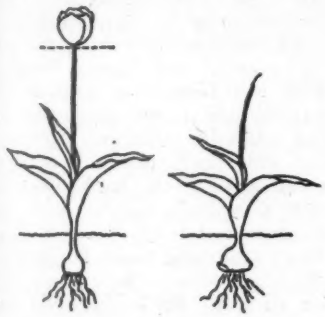


J. Horace McFarland

PARROT TULIPS FANTASY

requires hand labor, which is one of the handicaps of the entire bulb production.

The other "secret" of bulb growing is the treatment of soil. As previously mentioned in this article, the historical development of the Dutch bulb industry was mainly on light sandy soil, but it is not the bleached out sand such as is found in Florida or in the desert. It is a sand which contains some clay and much humus. The cool Dutch climate helps to preserve the humus, and one of the important points is that the soil is loose and aerated and does not cake. The bulbs and roots don't like a sticky soil or standing water. It is this condition which causes rotting very easily.



Left: The dotted line shows where to cut off the blossom of tulips in order to reverse the growth towards the bulb formation.

Right: When the stem is wilting the plant begins to form small secondary bulbs.

From the study of humus, of which much has been written in this magazine, we know of the superiority of a humus soil, which is crumbly, keeps its moisture during draught, absorbs excess moisture, is rich in plant nourishment and possesses all the qualities a tulip bulb requires in order to multiply.

This inner relationship between bulb and humus is well known also from other members of the onion family. Onions grow best in a humus soil. When onions or their remnants are put into a compost heap, earthworms migrate into this material and multiply by the thousands. There is really nothing better than onion or chicory humus to stimulate the fertility of the earthworm.

Bulbs require rich soil with easily accessible ingredients in order to become bulky, but they do not like fresh manure. The tulip farmer obtains manure from nearby dairies and digs it into the soil, about one to two feet deep, following the trenching system, e. g., trenches out one width of a bed, fills in the manure and covers it with the dug out soil. Some dairies in Holland having either no litter or insufficient litter, produce a kind of half liquid manure by draining the droppings and liquid manure together in a tank. This juicy material called, "beer" (bier) over there, is also used for filling in the trenches.

This writer has been consulted by several people as to the causes of fungus disease and the easy rotting of the bulbs, and invariably it was found to be due to the use of fresh and unfermented manure. The soil and manure should be thoroughly mixed, and this process is only possible if the manure is well fermented and first transformed into humus. Since the trenching and digging in of the manure is quite expensive due to the hand labor involved and is a disagreeable job as it has to be done kneeling down, the production of humus-manure is preferable. It is time saving and gives value in relation to the health of the plant.

Therefore, it is preferable to spread composted manure on the tulip fields and work it into the soil with a roto-tiller or Gravelly

garden tractor plow. Both tools, in connection with the organic fertilizer can be considered ideal for preparing a tulip "seed" bed, inasmuch as they crumble the soil and mix in the fertilizer thoroughly.

The harvest takes place relatively early, most likely about July. The Dutch growers who have specialized in bulbs follow tulips with narcissus in the second year, sometimes hyacinths and other small flower bulbs the third year. Then the procedure starts again with digging, manuring, and tulips. A crop rotation is very important. We have even observed that tulips can do well in a garden or agricultural crop rotation if they take the place of a root crop and the soil is well prepared.

From the point of view of health and resistance against fungus and pests, it would be preferable to lengthen the interval between tulip and tulip. Four years is better than two, and a six to eight year interval would be even better. The commercial bulb specialist cannot afford an interval exceeding three years for there is nothing else for him to grow other than the already quoted rotation of bulbs of one kind or another.

If a vegetable or flower grower or even a farmer has a few acres of bulbs as a by-product he will always have that particular field in excellent condition, well fertilized and free of weeds and can grow everything afterwards. We have had an excellent stand of wheat after tulips. Late cabbage and brussels sprouts are also suitable if the summers are cool.

Since the compost is already rotted and in a neutral state, rich in colloids, it is not harmful to bulbs. It particularly stimulates the growth of roots and safeguards the bulb multiplication. The above described procedure of filling under composted manure with a mechanical tool reduces the time for preparation of the planting bed to one-third or even one-fifth of that of the old-fashioned knee and hand digging method.

It is evident that the former way of preparing the bed worked out most favorably in sandy soil as this soil is well drained. It is gradually enriched in humus and is easy to work with. When the bulbs are harvested they separate easily from the sandy soil, requiring little rubbing and scratching which may damage the outer layer of the bulb. These favorable conditions may be responsible for the development of the bulb industry mainly north of the Hague.

A heavy, sticky clay soil, particularly a wet one, is, of course, unfavorable for obvious reasons. However, the picture changes entirely when considering the advantages of the organic and humus method. With well fermented compost and manure-humus, one obtains a very fine crumbly structure, also with clay soil. Such treatment provides a well aerated soil, due to the presence of colloids, and it holds the moisture and fertility much better than a sandy soil could. Its crumbly structure means that the soil will not stick to the bulbs when dry, during harvesting, but will come off easily. Therefore, a very heavy dead clay is not suitable.

Under proper care and in rich humus soil the tulip plants form several and small bulbs

This writer has grown 12-15 acres of bulbs very successfully on clay soil, fertilized with manure treated according to the bio-dynamic method. Deep digging was not necessary.

J. Horace McFarland

TULIPS

The fields were plowed with manure spread on it and worked over mechanically.

The harvest has to be done by careful hand digging. A flat hand spade is used and pushed underneath the layer of earth containing the bulbs and lifted. It is therefore understandable why only a very crumbly soil will yield favorably to this operation. The bulbs must be handled carefully, as a good marketable product must not show any damage or scratches. They are sorted according to size,—the largest numbers sold; the medium and smaller ones replanted.

Tremendous amounts of fresh manure (20 tons per acre) have been buried in the ground in order to grow bulbs. With composted manure, however, 10 to 12 tons per acre will produce a very fine crop. A fine very crumbly soil will offer the best conditions.

The harvested bulbs are kept in flats in a dry, cool, and well aerated place. The flats can be piled one above the other if they are constructed so that air can circulate in between. It is most essential that the bulbs do not get moist and moldy.

During the growing season, the tulip plant is susceptible to fungus diseases. It has been observed that the infection is apt to spread out more easily if the leaves are touched by hand or tools, when wet, e. g., as long as the dew or rain drops are on them.

We have made it a practice not to touch a tulip bed under moist conditions, neither for weeding, culling or cutting the blossom. The leaves seem to have a thin protective film of wax which should not be disturbed. A healthy leaf has a greenbluish shine on it whilst a weak leaf

is more yellow-green. A similar observation can be made with many plants, such as cauliflower, beans, rye, wheat, etc.

It has been previously mentioned that the soil for bulb growing has to be well drained. This also is a protection against fungus diseases. It also helps to avoid the freezing out at winter time. Some people protect against freezing out by covering the beds with a mulch of straw or reed. This may be alright with light sand, but for clay soil we would not advise following this procedure, as it hinders the evaporation of the moisture. Mulching is alright to keep a soil moist, but this is not needed for bulbs.

Some breeders have made interesting studies while developing new varieties from wild tulips. These tulips brought from the Orient have to be acclimatized first, then reproduced and "taught" to grow larger and larger bulbs. To begin with they start with tiny secondary bulbs which grow deeper and deeper downwards from year to year instead of multiplying "horizontally".

They have this in common with wild garlic and onions. Once one succeeds in stopping this tendency, the battle is won and tulips will produce "bulbs". The author has supervised experiments in order to check this "downward" tendency. He found that certain plant combinations with herbs were able to stop the tendency and to influence the bulbs to develop as required.

These experiments have been interrupted due to the invasion of Holland in 1940 and we will have to wait until more settled conditions exist over there before the "threads" can be taken up again and more details revealed.

An interesting study is also the forcing of bulbs in order to have cut flowers in late winter. Whilst it is possible to have blossoming short tulips, which are usually sold in small pots, at Christmas, the long stem, so-called Darwin tulip, is not to be had before January or February if forced in a northern latitude in greenhouses. The main principle is that the bulbs are under-cooled after harvest. About a month to six weeks after harvest is when they are really mature and dry; they are put in flats and kept for six weeks at about 40° F. Some people have worked out a system of changing from moderate temperature to a lower one for two weeks, then to moderate again. We used to put the bulbs in the *cooling* room (the room where the big carcasses rang) of a slaughter house (not freezing) with good results. Then, by October or November, they are planted in flats with sand or sand mixed with humus, e. g., very well rotted, odorless and black earthy compost. At the beginning they are kept rather dry in a cold house, then gradually moistened and warmed up. In the beginning the flats may be covered with leaves or straw. The drier they are harvested, the better they are under-cooled, the better the manure is on which they were grown, the easier the blossoms will come.

With our bio-dynamically treated compost, and our bio-dynamic humus spray preparation on the soil or sand-humus, used for the forcing flats, best results have been obtained. Cut flowers thus obtained will keep longer and wilt less easily. This business involves many little tricks which can only be learned through careful observation and experience. The soil being used for forcing should not be used again for the same purpose, but is very handy for other flower pots, for amelioration in greenhouses, (vegetable) or spread on clay soil in order to make it less sticky. There are too many varieties of tulips to be

described here. The principle of growth is the same for all of them. According to the skill of the producer and the soil conditions there is quite a difference in quality.

If one really wants results, one should secure bulbs only from very reliable sources. To multiply bulbs is quite a business. We would advise the beginner to start with the commonest varieties in order to gain experience and then to shift to the rarer and more expensive types. To develop a new tulip requires years. Although one single bulb of a new variety may sell for $10.00—it does not always pay to propagate them. There will be 2-4 out of one in the second year, perhaps 16 the third, 64 the fourth year, e. g., the amount will increase and the value drop accordingly. By the time there are enough for sale, the choice of the public may have changed and no one may like the new variety. Years of work may be easily lost and what one has gained with one type may be lost with the other. It is therefore better to grow reliable varieties. If one has the time and some land to spare one could start on new things, more or less as a hobby. Should the hobby pay, so much the better. There are lucky people of course, whose hobbies do pay, but then we must not forget the tulip bulb depression of the Thirties in Holland from which the Dutch growers never completely recovered. In the meantime, other countries have learned something too and there will be great competition after the war. The small gardener however, could make an interesting hobby out of it and maybe get somewhere.

Various Mulches

THE STANDARD reference works frequently warn against the use of green manures and the turning under of straw because these practices are said to deplete the soil of nitrogen. The bacteria which break down the grass and straw utilize nitrogen and deprive the plants of their food. This, however, is only temporary, if at all true in this general form. Professor *Stephenson* and *C. E. Schuster* ran an extended research at the *Oregon Experiment Station* and showed that straw mulch not only saved moisture equivalent to 2-3 inches of rainfall, but allowed nitrogen to collect just as much as if the field had been cultivated. With Faulkner's emphasis on "trash farming", it is interesting to learn that straw saved more moisture and also caused a higher increase in soluble potash than trash mulch. Under these circumstances it may be well to mulch more and plow under less. But this method will in some regions increase the number of sowbugs and snails. That is why the gardener has to use discretion in applying mulches, whenever low growing vegetables are involved.

Fish And Nips

From the FERTILISER JOURNAL,
London, England

My dear "Scepticus":

You will, I am sure, forgive this damp letter from a stranger. I can hardly regret, however, the fact that we have not been introduced, for the only introduction possible in this world would be painful—first I should be caught in a net, then after much anxiety banged on the head (which might or might not mean painless death), and even then we should not meet until I had been fried in oil and surrounded by chipped potatoes. The only consolation I should have in all this is the knowledge that your wife had to queue up for me for hours.

My reason for this letter out of the blue (literally) is that you seem to have some influence with the Editor of the *Fertiliser Journal*—indeed, judging from your articles, some hold over him. I plead, therefore, not just for myself but for the sake of millions of my fellow-creatures, that you will place the following argument before the Editor. For the article he published in the issue dated November 8, 1944, which reached the bottom of these Northern waters only a few days ago, has caused all of us in the fish world much concern.

This article was entitled, "Intensive Cultivation of Sea Fish". No doubt you saw nothing objectionable about this except the fact you had not written the article yourself. But how would you feel if you picked up a copy of *The Cod Circle* and saw the headline, "Intensive Cultivation of Human Beings" or even "Intensive Cultivation of British Citizens"? Need I say more? We fish may be cold-blooded but we have our private lives and independent feelings just like other democratic creatures.

However, any resentment we felt at the title was as nothing to our reactions to the article itself. We were to be treated like turnips and potatoes and fed with chemical fertilizers! And, in the second paragraph, the anonymous writer dared to say that this idea was not as fantastic as it seemed! No doubt to a species of life to whom mutual destruction by high explosives is all in the day's routine, to mere muddling, murderous man the word "fantastic" has lost its meaning. You will forgive this bitterness, but I must emphasize the considerable differences in culture and civilization between your world and mine.

The writer proceeded to regret that "the fish population shows no marked tendency to increase." I thank him for his altruistic concern, but I would suggest that regrets, like charity, begin at home. I read in occasional newspapers that reach the bottom here that one group of humans now propose to pay family allowances to encourage increase in their own numbers. But in any case, when I contemplate the results of past increases in the numbers of human creatures—the wars, the depressions, the demands for living-space by this group and that—I feel proud of the efficient administrative arrangements by which we fish control our numbers at a stable and suitable annual level.

The article then suggested that the limitation of our population was due to a shortage of food. My dear sir, a shortage of food—when every one of your modern cities within fifty miles of the coast pours

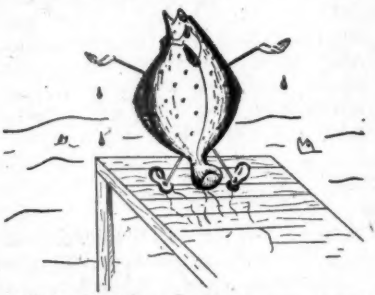
all its valuable fertility into the sea! However, let that pass. This absurd assumption having been made, it is then proposed to give us extra food by dropping bags of sodium nitrate and superphosphate into the sea. Ye gods and little humans! However, you know nothing about feeding yourselves; you have still, alas, to learn that vegetarianism would suit us all better, you have thrown away thousands of your best acres by erosion, you were burning food ten years ago while many of your own kind starved, and now you look upon dried eggs, dried milk, and dehydrated cabbages as a square meal—I cannot expect you to show any intelligence about feeding us! Sodium nitrate and superphosphate!

Still, I realize it will be quite futile to approach this problem only from a fish angle. The present state of the world makes it clear that the human race considers all matters from their viewpoint only. But, since in this matter the proposition is as ridiculous from the human angle as from the fish angle, it would seem both wise and practical to effect a negative solution agreeable to us both.

The first point I would make is that we fish are very mobile. We differ in this respect from cabbages, turnips, and the rest. They cannot run away from your chemicals,—we can. Second, my dear sir, the sea is a rather large place. Of course, you could *theoretically* cover all the water-fronts with your chemicals but in practice this is impossible; the calculated amounts of fertilizers needed to provide 0.01 per cent of N and 0.01 per cent of P205 in the Atlantic or in the North Sea, compared with your world production of these commodities, will, I feel sure, give you a better idea of the meaning of the word "fantastic".

Another somewhat practical point lies in the difference between areas of land and areas of water. Let us temporarily make this absurd assumption that fertilizers could increase our growth and our numbers. Since we fishes are so mobile, we are unlikely to be "harvested" in those same area wherein we have been chemically fed. I cannot see how your present economic system of private enterprise can possibly support a proposition whose costs will be borne by one capitalist or company but whose benefits will certainly be reaped by another.

You cannot solve this problem even by some ingenious device such as floating barriers to stake off areas of sea, for we, the fish, would



still be mobile. So that, even were it a sound scientific procedure, the addition of fertilizers to the seas is quite impracticable until the world is one economic unit with only one balance-sheet; that is, until universal communism or until one limited liability company has absorbed all the others. And even a poor fish cannot help knowing that this will not take place for many centuries.

Of course, in their experiment, your scientists evaded this issue, as scientists always do, by fertilizing an area of sea that could be "iso-

lated at will". The loch dam sealed up not only the chemicals but also the unfortunate fish. (A little point your scientists forgot, by the way, is that under these conditions the fish *had* to eat the chemicals in the same way that a prisoner in a cell has to eat bread and water. Had they been free to go where they liked, they might not have touched the stuff.)

Here I would like to make one minor digression. The article stated that "plaice and small flounders were *liberated* in the experimental *enclosure*.". (My italics.) From newspapers that drop from ships from time to time we gather that at the present moment certain groups of humans are busily liberating other groups, and that this process is expected to end the current war. Now we, as fishes, are suffering very badly in this war what with bombs and depth-charges and so on, and until this article about fertilizers we were feeling optimistic. But now we wonder what the word "liberate" means—for you talk of liberating fish in a dammed-up enclosure, which of course is nothing more than imprisoning fish. If your political use of this word is as faulty as your scientific use of it, we feel that as soon as this war has ended a number of other wars are only too likely to start.

A small point but it worries us.

Still, I think that covers the main points for the moment. Should you feel unable to co-operate, perhaps you would forward my letter to Sir Albert Howard, who might be interested in taking us under his wing. After all, there is no harm in trying to show that we shall only develop fin-and-gill diseases and be worse off than before if we are fed upon chemicals.

Meanwhile, my family and I are keeping away from Scottish lochs this season. Thanking you in anticipation, and hoping that, if I ever do meet you, I shall at least not be salted or frozen.

Yours solely,

A. FLOUNDER.

Ecology

THE SCIENCE of ecology deals with the interrelation of various plants and animals, their living together and their movements. When the bird-lovers attempted to secure havens for the migratory birds on islands off the coast of Florida, the fishermen were up in arms, because they feared that their catch would decrease. The bird-lovers said NO. Thus a big experiment in ecology took place, islands were secured, and the birds could stay there undisturbed. They caught many millions of fish, but the number of fish increased just the same. The birds dropped thousands of tons of guano, right around their nesting places. This increased the plant life around the isles. Thus the schools of tiny fish could find shelter against predatory fish and plenty of food. And the number of growing fish for commercial needs increased due to nature's working for the benefit of all. The experiment had succeeded, and different animals can live side by side, on each other and for each other.

A Modern Herbal

By ROBERT O. BARLOW

VIII, MINT

THE number of mints is legion, You must first disregard those of the genus *Koellia,* like Virginia Mountain Mint; of the genus *Cunila,* like the Stone Mint; and restrict yourself to the genus *Mentha,* from which Latin word our own word *Mint* is derived. The number of mints in the proper sense is still considerable, and the botanists mention among others the spearmint, the peppermint, the bergamot, horse, water, cross, corn, small-leaved, round-leaved mints. Close relatives of these are the bugle-weed, the water hoarhound, citronella, and even thyme, all of which are lip-flowered plants. I once saw a creeping bright-leaved mint with very small leaves in a garden, but I have never found its description in any book. There are undoubtedly many more mint species and varieties in the world, and it is already well established that they differ greatly in volatile oil content. Similarly, the flavor of each variety differs.

This is as far as I had written when H. K. Meyer handed me a booklet, *The Herbarist,* No. 4 (1938), published by *The Herb Society of America.* In this booklet there appears an article by Dr. Mabel Ruttle, who collected mints in Germany, Switzerland, England, and the U. S. A., who bred them and hybridized them, investigated how they reproduced by seeds, and counted their little chromosomes or dye-bodies. It is remarkable how everytime that a plant species is carefully investigated it becomes hazier; the case I mentioned on bulbous plants in a recent issue is here duplicated. Miss Ruttle has got farther than Dykes got with tulips, because she knows how the various mints connect as to chromosomes, but it is already apparent from her work that mints can be hybridized and do, even under natural conditions, mix to an extent that makes the designation of separate "species" a highly speculative enterprise. There are naturally more crosses than pure lines. But I am inclined to think now that my small spicy mint was perhaps the Corsician mint.

To me a very strange phenomenon is this: Mints grow best in moist places, in ditches and heavily watered garden spots. Yet, at the same time, we always find them naturally in sunny locations on hilly sides. There they look green, whereas in moist places the purple color predominates. In the light of Dr. Ruttle's research, it is impossible to uphold all the old distinctions. It used to be commonly said that the spearmint sends out leafy shoots while the peppermint propagates by suckers under the earth. But with the constant intermixing that goes on, these growth habits cannot now be considered essential. Originally, the mints were, like most of us, immigrants from Europe; but they have become naturalized citi-

zens almost everywhere in the country.

Mints should be picked in the morning, before the day's work of growth has started; they should be picked before flowering; and the tender leaves on the tip should be preferred for their fragrance. When

you dry them, see that it is not in the sun, because heat makes the volatile oils rush off too quickly, and your tea will be less fragrant. If you want to start a mint bed, plant an old stock in new ground. Mints are ravenous growers and eaters; they will not succeed for very long on the same spot. Their suckering makes them quick wanderers, which also explains their migrations all over the world.

But why should mints be so popular? First, for their refreshing fragrance, which is used in tooth powders and candies of all sorts. What the drug business would now do without mints cannot even be estimated. Second, mint is a good means of curing stomach trouble. Pick a few fresh leaves, drop them in boiling water, but do not boil, and you will receive a yellowish-green tea. Those of us who have a fine tongue will probably prefer the unsweetened, fragrant drink to the one commonly used. For even honey cloaks and distorts the mint's fine fragrance.

Chemically synthesized menthol is not a true substitute for genuine mint oil, because the natural oil consists of many different organic compounds. Besides menthol, there are menthen, menthon, and others. The same happens as when you try to reproduce the pure fragrance of natural honeysuckle with its lemony spiciness; you will obtain the disagreeable smell of the chemical honeysuckle, even though the latter may be the "pure" compound of the principal frangrance; but nature does not particularly care for purity. She likes mixing. Or perhaps we should say: Nature balances her organics better than the laboratory technician. And he who would have the best had best follow nature, not the technician.

Interesting Letters Department

POPPIES AND PESTS

I NOTICED in one of the Organic magazines, an inquiry about cut worms. We lived in Colorado and the cut worms were so bad that they even ate the onion tops. We tried various ways to get rid of them, and every night when my husband came home from work we would go into the garden and start digging along a row of vegetables for cut worms. Sometimes we let the chickens out also. The soil there was sandy loam. I had often watched the robins dig into the ground to catch the cut worms. I asked every one how the robin knew that there was a cut worm in the ground. Some said he could hear them working, I said that is impossible for the cut worm usually comes out at night, and he eats on top of the ground. Some suggested that the robin could hear them breathe, but I said no that wasn't so. Still every time I saw a robin reach into the ground for a cut worm, I watched him. Finally one day I noticed a tiny pile of dirt like an ant hill. I at once went to the back yard in the onion patch where I was sure to find cut worms, and I saw several little piles of sand. I dug into the first one and found a worm, but I wasn't satisfied, I also dug along the row to the next sand hill, but only when I got to the sand hill did I find a worm. When I was satisfied that I had discovered the robins way of getting his worm I went into the house. When my husband came home we went into the garden as usual to dig cut worms. I watched him a minute then said, you won't find any worms there, and I pointed to where there was little hills of sand and said there was one in that place. He dug along the whole row as I had and he did not find any only in the places I pointed out. Then he said, how in the dickens do you know, have you X-ray eyes, can you see through the ground? Sure, I told him, I can see a worm right here, and he dug it and sure enough there was one. Well I kidded him a while, then showed him how he could tell, and that I had learned from the robin. But where there is heavy soil it is difficult to find them, but I also solved that. One night in my dreams I was planting, one row of Shirley poppy seed, and two rows of vegetable or two rows of flower seeds. During the last world war we had a good sized garden patch. I had never tried to plant cauliflower, or cabbage and some other things but I had them in this garden. I thought I am going to plant one row of poppy seed and two of vegetables, or flowers. I had a patch of onion sets about 25 feet square, and every third row I planted poppy seed. I never had any poppies in the patch where it was near the alley, or along the front of the yard. Across the street and alley were vacant lots that had never been plowed up, and mostly tumble weed grew there. Toward the center of the yard there was plenty of poppies and they were a beautiful sight, people

passing would often stop and look at them. Every morning the bees would come and gather the pollen and by noon there wouldn't be a flower in sight, the petals had all fallen. (In California though, they will last two or three days). Well, we did not have many cut worms. The next year I spaded up the garden inside my yard rather late and the cut worms were thick, until the new poppies started to come up. I did not know then that the poppies would come up volunteer, but we had spaded the ground too late to scatter the seeds so the first early garden was eaten by the cut worms.

An Austrian told my husband, the cut worms were so bad that they were eating the alfalfa, and only where his wife had some garden and flowers that they did not bother. My husband asked if his wife had poppies in the garden. He had to wait till the next day to tell my husband and he said his wife had planted a row of poppies all around the garden. Some one told me that in Europe the Dutch and some Germans always planted the poppies. In France I think they did also, for the Flanders poppy is a species of Shirley poppy.

Since we have been here we met a man and his father who lived in Idaho, and used every fall go to visit the Indian Chief of one of the tribes especially if they wanted the Indians to have a rain dance. This time the chief told him to plant poppy seed all around his wheat field, for he could see an army coming. The father asked if the Germans were coming over here. No, said the chief, army of worms, and they will kill the wheat. Some of the farmers believed the chief and they sent east for poppy seed and it arrived by express. One man laughed at them and said, Oh, I guess I will get the good of it the same as when they have a rain dance. He had in ten thousand acres of wheat. The father and others drilled in the seed three feet around their fields. When the worms came the poppies were up growing. This man said that the worms took most of the poppies excepting the inner rows. They went across that fellow's ten thousand acres in one day. The wheat was in the milk so it rotted and did not even make hay. The worms left about ¾ of an acre, and then traveled on around a lake. After they were gone he said in the part where the poppies were the ground stunk, and they found dead worms. All those who had poppies around did not lose their wheat.

Now in Colorado we found that the cotton wood trees harbored the worms. The moth lays its eggs in the new bud that is forming in the late summer and lives in that till spring. When the buds begin to open that little brown shell part that comes off forms a little boat and the wind carries them several miles. The old worm spins its chrysalis in the ground and if you dig the ground up in the fall before freezing you will turn up the brown chrysalis, and if the ground is left rough it freezes. Even turning up the ground will help getting rid of some of them. The gum that protects the new bud during winter seems to also protect the moth egg. Spraying cotton wood and perhaps poplar trees while dormant would help control cut worms.

A few Shirley poppies planted on vacant lots make it a beautiful sight and they will reseed themselves after the first year.

Yours truly,
Mrs. H. O. Le Mon,
Los Angeles, Calif.

The Fertility Of The Soil And Its Relationship To Dental Health

By E. BRODIE CARPENTER, L. D. S., R. C. S. (England)

THE spectacle of the dental surgeon talking to the gardener usually means that a conference is in progress about the dentist's tomatoes, but I feel that these two are really a pair who should work together.

I look after a school containing 97 girls and 137 boys and have complete control of all the treatment. The object of this article is to show that during these war years the teeth of the children have vastly improved and that the reason can be found in the soil.

This school was founded nearly 100 years ago in Middlesex to help the orphans of a section of the community who support it by voluntary contributions. The school has eight acres of land attached, producing fruit and flowers, and was divided into many small gardens for the children. Two horses were kept for the work, but there was no question of self-subsistence. There are large playing fields to be kept cut, and a considerable number of outbuildings, as was always the case when the Victorians got to work to start an institution.

In 1939 the head gardener, Mr. B. Norman, took in a field of 5¼ acres for cultivation. It is Middlesex clay and from my own experience I consider him a brave man. He tried potatoes, but the following year harvested only shells containing slugs. He then fumigated the soil and cut the field up into mixed roots, cabbage, and lettuce. There was great trouble in breaking up the clay and ashes; straw and manure were put on by the ton. Mr. Norman tells me that in Middlesex the fibre or humus remains in the soil for four years after it is turned in, so with his fibre manure from his horses and straw he had a good basis on which to work. Later on he introduced pigs and poultry; the latter are fed on grain and the droppings are not all soft like those from the mash-fed, but hard and can be powdered. Asked if he ever used artificial manure, his answer was blunt and concise: "Don't believe in it." And now in the sixth year of the war he produces the most magnificent food from that field I have ever seen—like the pictures on the seed packets in fact. The outbuildings are useful as they are all storehouses, and the school is completely self-supporting for eggs, bacon, fruit, roots, and green vegetables.

Lawn clippings from the playing fields, refuse not suitable for pigs, and leaves all go back on the 5¼ acre field and the smaller plots containing gooseberry bushes and fruit trees.

The children help with the cultivation and are very keen. They receive as their reward a ¾ lb. carrot to eat raw or a whole Webb's Wonderful lettuce as big as a cabbage. I cannot think of a better reward than to be allowed to eat this vital

food straight from the ground.

The school tomatoes are quite an experience to see. They are grown in frames made of brick, without sashes, and the only manures used are horse manure and dried blood.

Milk is not produced on the premises, nor meat. The ration is, of course, shared out in the usual way. The children have always had a certain limited amount of bought milk, although during war-time it is cut down in the bad months. Butter is mixed with margarine and very carefully shared. Vegetables are ordered by the kitchen and are brought in freshly cut when they are required, and once a week at least they have a salad of new cabbage, beetroot, onion, and grated carrot during the winter. The whole school gets eggs according to the season, but even in the worst months they have about one a week each. Bins full of eggs are preserved for the winter, and large quantities of fruit from the farm are made into jam. Feeding arrangements might, therefore, be called sensible and well balanced with no cranky element.

Children often come to the school having had a hard time and if they look a little thin and pale they are given cod-liver oil and malt.

The effect of the foregoing set of circumstances will now come under discussion from the point of view of the children's teeth. The standard of these teeth in 1939 was certainly poor. As I have just remarked, some of the children had been through hard times and although their teeth were supposed to have been put in good order before entering the school, this rule was not always adhered to by parent or guardian. At the first examination it seemed impossible to get them in order and keep them in order. I started off a thorough campaign against old toothbrushes and no toothpaste with the idea of getting a consciousness into the school about their teeth. The next year, 1940, the situation seemed as bad, and in 1941 I did not feel any more cheerful. My colleagues said that obviously about 250 patients needed more time spent on them than I was allowed. 1942 was a year of spasms of hope, only to be dashed at the next examination, and then I began to feel that something was helping. The mouths seemed clearer and there was a better consistency of the saliva.

The headmaster discussed the possibility of diet, and it appeared that there had recently been a housekeeping sister who had paid special attention to the meals. Raw salads were the order of the day and a great deal of time was spent in making the meals attractive. The children liked the salads and, although they may have grumbled at the food before the war, they realized that they were very lucky and had more variety at school than at home.

Suddenly it became obvious that something had happened—by May 1944 the standard had gone up to 'good'. It was possible to keep pace with the decay and keep a special eye on the weaker ones. There was time for polishing and encouraging a pride in the children's teeth. There is no doubt about the vast improvement and although conservative dentistry can go a long way it does not prevent the incidence of decay. It prevents the spread; it should educate in the care of the teeth, but it cannot play King Canute—with any more success than the original—to a tide which has established itself in more than 200 mouths.

Results

GARBAGE COLLECTORS!

Every year the city garbage department gathers the leaves in this city of trees and those which are free of trash are stacked in vacant fields, where they compost and are free to the citizens for the hauling.

Any citizen with a place to put a compost pile can call the city department and ask that leaves be brought to him when being gathered in his neighborhood. This costs him nothing and saves the city expense of a longer haul. The writer gets about 15 loads a year and I know of another party who gets from 50 to 60 loads for his large place and uses it every year.

The city commission and the newspapers have been very helpful in furthering the plan and as Memphis has been awarded the honor of being the cleanest city of its size group in America you can see that a good job of cleaning has been done.

W. C. Paul,
Memphis, Tenn.

•

MULCH

I could tell you a story of a pear tree. It yielded 20 bushels last fall. *Has never been sprayed* for 20 years. But it and 2 others can stand mulching and treating as you advocate and will get it this spring.

S. W. Edwards,
Silver Spring, Md.

•

WORMS

I bought a hundred lbs. of humus this year to help out until mine is ready. When I planted a row of seeds I would use a half of a bucket of humus right in the row. *And it looks like all the worms in my garden are making holes in the rows where I used humus.*

Harry Hopkins,
Philadelphia, Pa.

•

HUMUS IN ABUNDANCE

We planted a 2 acre asparagus patch. We got this land first in shape by plowing a green crop under for 3 years. The fourth year we planted it. After 3 years we picked out first pips. The customers who bought our asparagus told me: "Your asparagus tastes so much better than any other, what makes it so"? Well the reason for it was, as I noticed during the last plowing those heavy streaks of humus in the fresh plowed furrow. Here is the secret, *humus in abundance.*

W. Wanfried,
Emmaus, Pa.

•

BETTER FRUIT

My field records show that an application of 1500 lbs. of dry hay, applied every third year under a mature fruit tree, *raised the average yearly crop nine bushels per tree,* as against check trees which received chemicals.

Geo. F. Richards,
New Britain, Conn.

•

WAITING FOR 20 YEARS

O. G. brings the information that I have wanted for twenty years.

Mrs. Orry M. Rogers,
Orange, Mass.

THE AUSTRALIAN ENVYS AMERICA

The magazine *Organic Gardening* I might mention is of particular interest to me, as I have used the Sir Albert Howard method of composting with excellent results for some years now. I wish we had a magazine out here like the one you have in America.

Frank H. Berger,
Ermington, N.S.W.,
Australia.

•

TO SPRAY OR NOT TO SPRAY?

A writer in a weekly review refers to a very heavy yield of apples (Cox's Orange) or first-grade quality, absolutely free from any evidence of insect or fungoid pests, being produced from trees which had never been sprayed or otherwise attended to in the orthodox way.

Last autumn I had a similar experience. A neighboring cottager had a full yield of Bramleys' Peasgood and other varieties with which it was hard to find fault. The fruits were of good size and without blemish, yet no spray had ever been used , and g r a s s, nettles and brambles covered the ground right up to the boles of the trees, the pruning of which had been done anything but well. Close by there is another cottager who, an experienced gardener, spares no pains over both winter and summer spraying. He prunes intelligently, his cultivation is good and general garden management exemplary. But, nothwithstanding, his fruit of the same varieties were not comparable in quality with those of the neglected orchard. They were, on balance, definitely second-rate and considerably marred by disease and pests. These are not rare and isolated examples. They may prove nothing; but when one sees the thriftless being rewarded and the conscientious worker's industry defeated, our old friend the force of example rather loses weight.— T. R. Whitecroft. *My Garden*, February, 1945.

Valuable Industry

BEN VAIL of the National Retail Grocers Association writes in *Pennsylvania Vegetable Growers News* that next to groceries, including canned goods, the fresh fruits and vegetables formed the biggest cash item. While people buy $600,000,000 worth of meats, they spend a billion on fruit and vegetables. Potatoes come first, tomatoes second, lettuce third, onions fourth, snap beans and carrots next; then cabbage, peas, spinach, asparagus, and the rest. Rasmussen of Cornell University states in the same magazine that 48 different vegetables were sold. Strangely enough, three of the most delicious were not handled in many stores. Kohlrabi, knob celery or celeriac, and oysterplant or salsify. If properly introduced, these three ought to offer work and success to growers of the future. For they are truly delicious, unique, and extremely rich in valuable nutrients.

Hints For The Victory Gardener

This is the thirty-sixth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

ORACH

By ROGER W. SMITH

IN some parts of the country it is almost impossible to grow spinach because the plant bolts—forms its seed stalk—before forming its crop of edible leaves. If your garden is located in one of these areas, if it is subject to periods of drought, if the soil is alkaline or even saline, orach may be grown as a substitute for spinach.

Orach is the name given any of various plants of the genus *Atriplex* especially *A. hortensis,* sometimes called Garden Orach or Mountain Spinach. It belongs to the goosefoot family which also contains the saltbushes. Orach is a hardy annual often reaching from six to ten feet in height when conditions for its growth are favorable. Exceeding spinach in hardiness, orach is often grown in gardens having an elevation of over seven thousand feet and a summer night temperature of fifty degrees Fahrenheit.

It prefers a dry rather than a humid location and although it will tolerate something akin to desert conditions, where dryness is excessive, the soil moisture necessary to the successful formation of its rapid, succulant growth must be available. The soil may be sandy and alkaline but it must contain a certain amount of organic humus beneath its surface. Where this humus does not exist, it is best to provide it by deeply digging in quantities of compost humus or well rotted manure. Where rain fall is inadequate, water must be supplied in some other manner.

Besides its ability to thrive under conditions unsuited to spinach, orach has many very marked advantages. Because of its tall erect growth its leaves are held clear of the ground, the plant is not damaged as much as the low-growing, compact spinach often is, by drifting sand.

Orach starts its seed stalk while quite young but continues to form large, tender leaves on the upper part of the plant and the harvesting of these leaves may be carried on even when the plant is forming its seed. These leaves will provide you with a continuous crop throughout the season, and the seed may be saved for sowing the following year. Where orach seed is produced in quantity, as in some parts of Mexico, it is milled and bolted into a brown flour of a very delicate flavor which is used in the making of excellent cakes.

Orach seed, which usually germinates in from three to seven days,

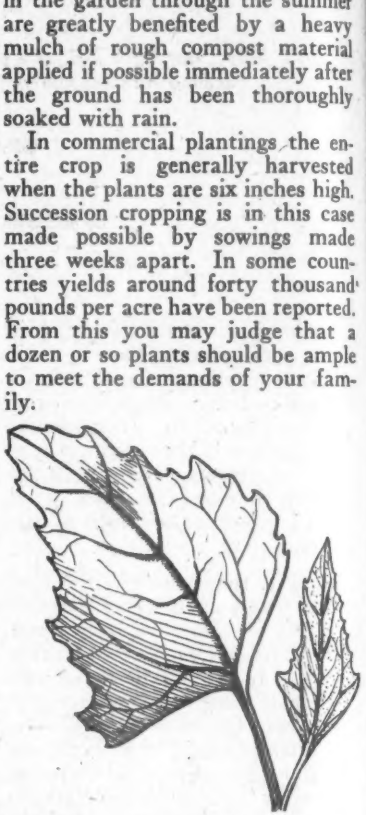
is best sown in rows thirty-six inches apart, much like spinach, and covered with not more than one-half inch of finely sifted compost humus. If you have to substitute sand or fine topsoil to cover the seed, you will find it best not to cover it deeper than one-quarter of an inch. This is because the "damping off" of orach seedlings is one of its few troubles, and tests have shown that the danger of "damping off" is greatly increased by a too deep covering of the seed.

When you grow orach you might like to notice how each orach plant produces four types of seeds—two kinds of black seed, and two kinds of yellow-brown seeds. Each seed is held between two bracts. Imported seed is usually sold with these bracts adhering. Domestic seed producers invariably remove the bracts in cleaning the seed because it has been found that seeds with the bracts attached had a much lower rate of germination than those from which the bracts had been removed. The bracts, like dried leaves, also made seed sowing difficult. At best, orach seed is rather low in viability and should be sown rather thickly in the drill.

Your first crop of orach will bring you greater satisfaction if you refrain from thinning the plants until they are about five inches high. The "thinnings" may then be used for culinary purposes. The seedlings should be thinned so that the plants that are to remain stand about three feet apart in the row. These plants will provide a fine supply of excellent material throughout the season and remain in condition if you do not pick any leaves having less than about three inches in breadth. Of course, you will avoid picking the coarse leaves near the base of the plant and will not strip it too severely.

Orach requires little cultivation. Those plants which are to remain in the garden through the summer are greatly benefited by a heavy mulch of rough compost material applied if possible immediately after the ground has been thoroughly soaked with rain.

In commercial plantings the entire crop is generally harvested when the plants are six inches high. Succession cropping is in this case made possible by sowings made three weeks apart. In some countries yields around forty thousand pounds per acre have been reported. From this you may judge that a dozen or so plants should be ample to meet the demands of your family.



Orach may be roughly divided into two main types, the green-leafed and the red-leafed, although there are many intermediate types. Triumph, a type having dark green leaves is most widely cultivated throughout the central Great Plains region. Gelbe, a "white" strain—actually its leaves are a very pale green,—is much favored in Europe and South America. Giant Red and other red, scarlet, and purple-leafed varieties are very popular in France. These colored types of

orach are listed from time to time by American seedsmen as ornamentals.

In olden times the fine texture of the large, delicate green leaves of the orach caused them to be much used as material in which to pack pats of butter. The orach is even today frequently called "Butter leaves".

When you cook and taste orach for the first time you will be agreeably surprised. The leaves are prepared as with spinach, although they are much easier to clean and have little waste. If "thinnings" are being used the stems should be removed because these become tough and woody at a very early age. The leaves have a finer, softer texture than spinach. Besides that, you will notice that whereas spinach loses some three quarters of its weight in cooking, orach loses only about one quarter. Extensive tests made over areas where orach is grown indicated unanimously that orach was preferred. You might like to try young orach leaves in the salad bowl, especially the red or scarlet ones.

Although orach is distinctly a plant suited to arid regions it will grow under ordinary garden conditions, it will form edible leaves almost anywhere but will not reach its maximum height unless conditions favor it.

Like its relative, the beet, orach will not thrive on acid soil. If beets do not do well in your garden, orach probably will not thrive either. It demands a soil neutral or slightly alkaline. It also demands good drainage. Fairly heavy applications of lime raked into the area where orach is to grow will do much to reduce soil acidity.

Orach is subject to attack from much the same pests that attack the beet, flea beetles, aphids, and the like. These seldom do much harm to rugged plants growing in a soil containing sufficient organic humus. However, young orach plants are a great favorite with rabbits, gophers, mice, etc. These little creatures seem to have a particularly discriminating sense of taste.

Like the beet, orach is very largely pollinated by wind-borne pollen. Seed you save is likely to produce plants showing the effect of cross-pollination with plants growing at a considerable distance.

And as you watch your orach plants grow, flower, and form their rather strange seed, you will find much of interest. Here is a really ancient food plant. Its common use as food long antedated recorded history. Practically as it grows in your garden it was known in the Mediterranean countries as early as the sixth century B. C. It had reached those countries only after a slow and devious route leading from its wild home in the littoral wastes of northern India.

Orach was well known to the ancient peoples who occupied the "Fertile Crescent", the Greeks honored it, nomadic Arabs had a name for it. After a very long career in which it was alternately honored and forgotten, after many centuries and through many strange lands, orach finally reached America's shores. Just when it came to this country is uncertain—it was before 1806.

After serving early settlers, orach was displaced in many areas by spinach. Recently, however, its use as a "greens" vegetable throughout the central Great Plains area and inter-mountain regions has greatly increased. Finding an area, perhaps, not unlike in climatic conditions its ancient home, orach has started once again on its way back to popular esteem.

The American Spikenard

By G. L. WITTROCK

New York Botanical Garden.

THROUGHOUT our rich woods in the United States there are many species that may be the source of food, medicine, fibers, or dyes. Some of these species have been staple economic plants of the Indians; to us they can serve as a novelty or even as an emergency, should ever the necessity arise. One of these common usable woodland plants is the American Spikenard, so plentiful in the forests from New Brunswick, Canada to Georgia and west from Minnesota to Missouri. This species, which was so important as a utility plant to the Indians of the past, is now rarely noticed by most of us except when in fruit, and then by some observing camper or hiker seeing it for the first time and inquiring: "Is this little cluster of berries poisonous?"; others asking: "Are they edible?" The answer is "no" to both questions with modifications. The species, however, must have been of some use to the hardy colonists and settlers of the past to account for the many common, descriptive, American names by which the plant has been known.

The common names that have been given the species have interesting suggestive meanings in reference to uses such as "Spice bush" and "Wild Licorice", two names that indicate the plant must have been used by some locally as a condiment or spice. Another series of names such as "Life-of-Man", "Old-Maid's-Root", "Nard", and "Aralia Bark" suggests a medicinal use. And some people must have used parts of the plant as a food to call it "Petty Morrel", "Crane Root" or "Indian Root". The "American or Indian Spikenard" is the most general common name used for the species.

The species is known to botanists as ARALIA RACEMOSA, a member of the Ginseng Family. The plant is generally from 3 to 5 feet tall, and is easily recognized by the very large zigzag, spreading compound leaves hanging gracefully from an erect, spineless stem in contrast to its cousin species, the armed tall "Hercules' Club" which has sharp flat spines on the stem. Another related species with large compound leaves known as "Wild Sarsaparilla" has no stem at all, the large compound leaves sprout directly from the rootstalk. All these related species may be found growing together in the same colony. The leaflets of the Spikenard are deeply ribbed and from 2 to 6 inches long, usually heartshaped at the base or cordate, and with doubled and sharply toothed or serrate leaf margins, the blades terminating in an acuminate tip. The inconspicuous clusters of feathery flowers which are greenish white, bloom from July to August followed by racemes of attractive globular reddish brown to purple berries which are most attractive and inviting because of their color and aromatic scent. The berries hang in loose racemes or clusters like loose grapes, only the fruit is very much smaller, rarely more than an 1/8th

of an inch in diameter and not very tasty but definitely not poisonous. The large roots, however, are thick and fleshy, perennial, and have pronounced stem scars of previous growth, and when broken open emit an aromatic odor and raw have a pleasant taste. It is the root that is of interest to us, since it has a delightful flavor and medicinal properties comparable to true sarsaparilla.

Indians had many medicinal uses of the plant which they taught to the early settlers and pioneers of our country. Peter Kalm, the great Swedish explorer, recorded in his

notes while exploring the eastern United States: "I myself have seen proof that no better plant can be found for treating sores than this one; the root is particularly good. It is also good for those who suffer from stone". The Indian medicine man prescribed the root of the plant as a treatment for blood poisoning; a poultice for sores; a tea from the roots for a stomach ache; a seasoner of medicine; the fresh root pounded into a poultice to bring a boil or carbuncle to a head; or the same poultice made hot and applied externally for inflammations. The medicine man would even chew the raw root into a pulp and place a bit of this pulp into a discharging ear to serve as a cure; or the chewed pulp was spread on cloth and applied over sores since the poultice tended to heal as well as draw; and finally, a poultice was used for sprains or strained muscles. This plant was considered one of the important Indian medicinal plants, and compounded with other wild plants of which a decoction was brewed and used as a spring and fall tonic. These many remedies may serve in an emergency, as they did in pioneer days when the root was considered a household remedy. It is still prescribed to this day by herbalists and it can be purchased in herb shops and even in some pharmacies.

The herbalists or homeopaths today prescribe the root of this species useful as a stimulant, alterative, expectorant, diaphoretic and to be also employed as a pectoral. The dosage is 1 to 2 teaspoonfuls of the root to a cup of boiling water and the decoction drunk cold 1 to 2 cupfuls a day. One herbalist recommends a cordial made with the berries for gout. All of these suggestions are merely remedies and it must be remembered, that the species is not listed as official medicine in our U. S. Pharmacopaea.

As a food plant, the species has some recognition by a few Indian tribes who relish the young tips of the plant in soups, a favorite form of Indian food since a soup is so readily expendable: if unexpected guests arrive, more water and ingredients could be added and a helping served to the welcome guests. One famous Indian dish is a mixture of spikenard root, wild

onion, wild gooseberry, sweetened with maple sugar, and those who have tasted it consider the dish excellent. One authority quotes a lady from Maine who makes jelly with the berries. And we must not forget that the root suggests sarsaparilla and is an ingredient in root beer, thus we could safely make a beverage to taste. The species is so plentiful and has so many possibilities that it should be more thoroughly investigated and tested and thus the American Spikenard may become one of our staple economic roots of the future.

Spikenard And Ginseng

THESE TWO PLANTS are related, both being members of the Aralia family which is known to many lovers of potted plants. You have seen the Aralia leaf scrolls open into beautifully cut leaves. Ginseng is discussed in the Farmer's Bulletin 1184 of the Department of Agriculture and available free through the Office of Information, USDA, Washington 25, D. C. Some Chinese doctors and some nature healers in this country have held Ginseng in high esteem, and Dr. Siegmeister, known to our readers as a contributor, recently wrote about its virtues in *Naturopath* (June 1945). There he describes the Chinese Li Chung Yung who "died in 1933 at the age of 256 years, married 23 times". Apparently, Mr. Yung did not let his wives partake of the powerful drug. They all died before him, except the 24th wife. But 256 years mean a ripe old age if they were counted the way we normally count our years.

Sprays And Yields

ORGANIC GARDENERS have long asserted that most sprays reduce not only the quality, but the quantity of fruit production. While commercial orchardists cannot overnight change over to a no-spray program and while the market demands are for a blameless fruit of good appearance and free from worm holes, the fact is that most sprays, used in codling moth and mite control, affect the growth of fruit and color of apples, and even may reduce fruit bud formation for the following crop. A summary of the work on these issues is contained in Overholser, Allmendinger, and Overley, *The Effect of Certain Sprays Upon the Apparent Photosynthetic Activity of Apple Trees*, Bulletin 477, Agricultural Experiment Station, Pullman, Washington.

The Deep Roots Of Compost

By Lt. Commander A. T. MacKay

I

TO the Roman farmer-citizen owing allegiance to Julius Caesar, a typical issue of Organic Gardening—Latin edition—would give little evidence of being other than contemporary. For Rodale, Meyer and Howard substitute Cato, Varro and Virgil, and our husbandman by the banks of the Tiber would raise his eyebrows only at the references to chemical fertilisers and poison sprays. "Devices of the barbarians" he would conclude, dismissing them from his mind, as he started a new compost-heap. He was adept in handling and storing manure so that its valuable contents were preserved. When he transplanted cabbage, he used seaweed for fertiliser. Green manuring with vetch, and crop rotation, were common practice. Budding, grafting and pruning technics were laid down for his guidance, by orchard experts.

Composting was old when Rome was new. Our modern application of organic fertilisers is not a recent discovery; rather is it a revival of an age-old practice, going back thousands of years, back of authenticated history into the shadowland of mythology. The Gods and Goddesses of Fertility held high rank in Olympus.

Our streamlined sophisticated civilization buries its dead in street clothing, with cheeks rouged and hair carefully brushed. Need we sneer at our remote ancestors who included hunting equipment and food in the grave of the deceased. For such a long and uncertain journey, only food which would not soon spoil or deteriorate seemed of value, and what could be better than cereal grains. In due course the enriched soil returned a bumper crop of barley and oats, and the spirit of the departed was doubly blessed. Gradually the association of burial with a good crop yield led to the custom of immolating one of the tribe, or a captive or slave, to ensure a bountiful harvest. The sacrifice of the firstborn, either directly or in symbolical fashion, probably stems from the same root.

It is to ancient Egypt that we go for the earliest records of organised agriculture. The ever present problem of maintaining soil fertility, faced by workers on the land of whatever period or clime, was solved for the husbandman of Egypt by the annual overflow and later subsidence of the Nile, leaving its residue of rich silt on the bottom lands. "There is corn in Egypt" was the ancient counterpart of our "Ever flowing granary".

Probably our oldest existing reference to the use of manure in agriculture is to be found on a set of clay tablets of the Akkadian Empire, which flourished in the Mesopotanian Valley a thousand years before Moses was born. Akkadia was overthrown by Babylon, which in its turn fell to Cyrus, but though empires crumbled, the knowledge and practice of organic fertilising increased.

As we have seen, compost was known to the Romans; the Greeks had a word for it, and so did the Tribes of Israel. From the first glories of the Garden of Eden to the sombre shadows of the Garden of

Gethsemane, the Bible is interspersed with references to the cultivation of the soil. The generic terms dung and dunghill, used by the learned theologians who translated the scriptural Hebrew and Greek into English, have numerous variants in the original as examination of a Bible concordance will show. Dung was used both as fuel and as fertiliser, but it is only with the latter purpose that we are concerned. Three methods were in use: the manure was spread directly onto the fields; it was composted along with street sweepings and organic refuse, carried through the dung-gate to the dunghill (more correctly compost-pile) outside the city wall; or else straw, its bulk reduced by trampling down, was soaked in liquid manure (literally "in dung-water").

In the parable of the fig tree—Luke 13:8—the gardener pleads for delay until he can dig about it, and dung it. The mode of fertilising trees was to dig holes about the roots and fill the spaces with manure, a custom still practiced in Southern Italy. The Talmud tells us "They lay dung to moisten and enrich the soil; dig about the roots of trees; pluck up the suckers; take off the leaves; sprinkle ashes; and smoke under the trees to kill vermin." From other sources we learn that the soil was enriched by the addition of ashes, straw, stubble and chaff, as well as with the grass and brambles which sprung up in the sabbatical (seventh) year, during which compost was not allowed to be removed from the pile. An exception to this sabbatical year ban was the permission granted under certain circumstances to fold cattle, for the sake of their manure, upon the land in need of fertiliser. Normally sheep were folded within walled enclosures from which their manure was periodically collected.

The most direct reference to composting comes from Jesus himself, in Luke 14:34-35 "Salt is good; but if the salt have lost his savor, wherewith shall it be seasoned? It is neither fit for the land, nor yet for the dunghill; but men cast it out." Substitute "compost-pile" for "dunghill" and the reference becomes clear, for much potentially valuable fertiliser which is unsuited for direct application to the soil becomes transformed into good humus in the compost process. Had the dunghill Jesus referred to been a garbage pile or city dump, the allusion would be meaningless.

This reference to salt deserves explanation. Salt in small quantity was used as a soil treatment, and to hasten decomposition in the compost heap. Too large an admixture was considered to produce sterility, as exemplified on the shores of the Dead Sea. (The American Farm Book, published in 1849, recommends salt as a soil treatment for its hygroscopic effect, attracting and retaining moisture; the fact that the author, a century ago, was an early convert to the chemical fertiliser school, suggests that his advice should be taken with the proverbial grain of salt!) The Jews held that salt exposed to the damp Mediterranean air would lose its virtue; such sodden salt would be useless as a soil agent.

Another Talmud passage tells us of the use of blood as fertiliser. The blood of the sacrifice, poured out before the altar, drained through an underground channel to a dump outside the city wall. Here it was sold to gardeners for manuring the soil, on payment of a trespass offering, without which its use for common purpose was prohibited, as it retained the sanctity of dedication at the altar.

According to the Hebrew Talmud, raw manure was not even permissible to the truly religious because it was unclean. The "people of the land", those who dealt with unclean matters, dead animals, manure, hides, and other things that required purification according to the old Law, were an exception, and they even failed to abide by the law that required the religious to fallow their lands every seventh year. Thus a Talmud commentator set down the rule for the faithful: "Do not use your manure until some time after the outcasts have used theirs," which is nothing but advocating the use of rotted or composted manure instead of fresh animal matter.

Our short-sighted practice of setting fire to straw and other dry refuse instead of composting it, was equally prevalent in Biblical days, as frequent references to the burning of chaff, straw and tares show. To add insult to injury, the custom was linked by analogy with the hell fire and brimstone future of the wicked.

Much of the agricultural wisdom of the ancients survived the blight of the Dark Ages, to reappear—along with other fundamental scientific knowledge—in the writings of learned Arabs. Ibn al Awam, variously assigned to the 10th and 12th centuries, goes into extensive detail on the processing and use of compost, and other manures, in his Kitab al Falahah or Book of Agriculture. Blood is recommended for its fertilising properties and the superiority of human blood for this purpose is casually endorsed. Elsewhere in other old manuscripts the manure value of crushed bones, waste wool, wood ash and lime is set forth.

The medieval Church was another repository of knowledge and lore, where, thanks to the efforts of a few devoted monks the feeble flame of truth was kept alive, while the rest of the country gave itself up to internecine pillage and slaughter. Within monastery enclosures sound agricultural practices were preserved and applied, and in some instances taught to the neighboring farmers by the Abbot, acting as a sort of medieval county agent. It is but natural that the charters of two old English Abbeys, St. Albans (1258) and the Priory of Newenham (1388) should enjoin the use of compost for soil fertility.

References to compost in the literature of the Renaissance are numerous, but space restricts us to a few quotations from the works of famous men, plus one or two noteworthy for their context. William Caxton, pioneer 15th century printer, relates " . . . by which dongyng and compostyng the feldes gladeth" Three renowned Elizabethans reveal in their writings that compost was a familiar word. Shakespeare's Hamlet advises " . . . do not spread the compost on the weeds, to make them ranker", and in Timon of Athens, Timon rages "the earth's a thief, that feeds and breeds by a composture stolen from general excrement" Sir Francis Bacon tells in his "Natural History" that plants degenerate by " . . . removing into worse earth, or forbearing to compost the earth". The unfortunate Raleigh, awaiting execution, writes of the soil "He shall have the dung of the cattle, to muckle or composture his land".

The word compost comes from Old French, but in the 16th-17th centuries various spellings are encountered—compass, compess, compast, composture, etc.

A real organic enthusiast was Tusser (1557) who boasts "One aker well compast, is worth akers three" and "Lay on more compass,

and fallow again" Detail is given us by Pultenham (1589) "The good gardiner seasons his soyle by sundrie sorts of compost; as mucke or marle, clay or sande . . . bloud, or lees of oyle or wine" Evelyn (1693) defines it "Compost is rich made mold, compounded with choice mold, rotten dung, and other enriching ingredients." A mere hundred and thirty years ago Bingley wrote "The neighboring farmers made them (herring) up into compost, and manured their ground with them."

Poetical contributions include:

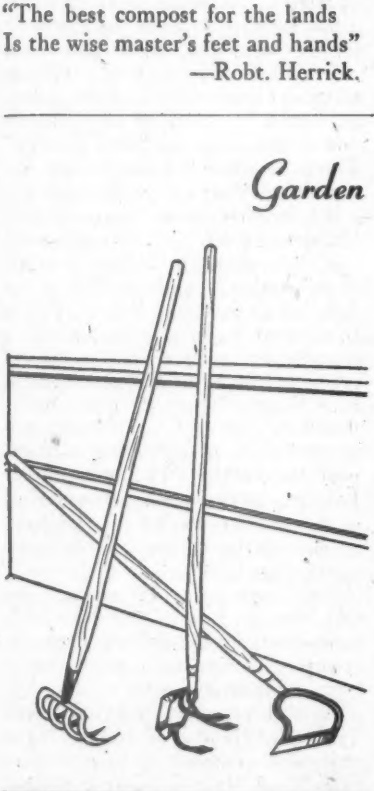
"The best compost for the lands
Is the wise master's feet and hands"
—Robt. Herrick.

"A cart he found
That carried compass forth
To dung the ground"
—John Dryden

"Turn the clod,
And wheel thy compost home"
—Wm. Cowper

The references for this article have been drawn almost exclusively from the literature of the Near East, the Mediterranean Basin, and England. America, the Far East and the rest of Europe have further wealth of allusions to, and descriptions of organic fertilising practices, but sufficient has been presented to forever squelch the charge that organic gardening is a "new-fangled cult".

Garden Devices



HOE AND SPADE

THE gardening tools of the primitive man were the hoe and the dibble. When the spade and shovel were invented is unknown, but they represent a definite advance. Some of the primitive African civilizations did not have them when the white man arrived. A further advance was the spading fork, which saves muscles and allows working in sods with ease, but cannot be used where roots and stones are in the way. The latest advance is a combination of fork and hoe. There has long existed a grubber suited to hoeing out potatoes. The new implements on the side are cultivator hoes of various designs. The forked hoe is very handy for turning compost.

Over the Fence

by H. K. MEYER

The treats in the *Gardener's Book Club* are getting better and better. Professor Headstrom's *Animals and the Gardener* is one of the most charming books you will encounter. Soon you will receive *Sunflower Seeds—The Miracle Food,* from the pen of J. I. Rodale, whose *Pay Dirt* bids fair to become a great success. He had published his original sunflower article in April 1945. After it was published, two chemists came forth with a gratifying support, writing in *Science* about this seed being superior in certain health values to whole grain wheat. In this connection, one addition to eating these seeds is possible: If you harvest some while the honey is still wetting the heads with fragrant sweetness, just after the flowers can be rubbed off, the seeds are so tender and juicy that you can eat the hulls with them. In our latitude this is about the end of August. There are many surprises in store for the Book Club members.

—o—

A wonderful scientific confirmation for composting is contained in a report of the Rhode Island Experiment Station at Kingston. For seven years past composts were made there with organic fertilizers as well as with inorganic ones, both natural and synthetic. Inorganic nitrogen did not raise the heat of the compost heaps sufficiently to destroy weed seeds. Among the organic materials tested were cotton seed meal and several sludge products.

—o—

Rereading the controversies about *Plowman's Folly,* about which many questions from our readers come to us, I came to the conclusion that the plow would outlast many another instrument, even if it has its shortcomings and weaknesses. Plowing under a heavy sod on my farm, in order to establish a more extended garden for experimenting, I was again struck with the good old moldboard. Instead of turning the sods around, it just moves them over and lays the organic matter in the place where it can rot and enrich the soil. But Faulkner is in some respects quite right—in some areas, let's say, the Texas Panhandle or some other plains, the moldboard plow and the straight furrow are the wrong thing; in those dry regions, mulching and disking are right, while in our moist East plowing brings about the aeration so necessary for heavy soils.

—o—

We invited Dr. Frederic E. Clements to contribute a work for our series in the *Gardener's Book Club.* Dr. Clements is the father of American ecology, the science of how plants live together; he is the author

of a widely used guide to the *Rocky Mountain Flora,* and famous for his many and varied works on plants, some written in collaboration with Mrs. Clements. But we regret to say that Mrs. Clements had to write: "In reply to your letter of July 24, it is my sad duty to inform you that Dr. Clements passed away on July 26th, and thus ends a noteworthy career. It is the irony of fate that this date should bring in more requests for contributions from his pen than any other similar period in his entire life." A great, and what is more, a very original botanist has gone, but his work lives on, and we hope that some of the work undone will be completed by Mrs. Clements, herself a scientist of repute.

—o—

We are really happy that we will soon print again on good paper and that we can print twice as many pages at the old price. Before long, we will have a still more beautiful magazine. Incidentally, we will still make mistakes off and on and hope to be corrected by the readers. In the recent article on seeds, W. Atlee Burpee was given the first name *Wm.* But we are informed that his first name was Washington. But such an error does not detract from the attractiveness of Burpee's catalogues and from the goodness of their seed. Incidentally, most of these are grown by Burpee's themselves or checked and tested at their farms.

—o—

In connection with Mr. Wittrock's article on the *Spikenard,* did you know that the well-known climber, *Ivy,* is a close relative of the pot plant *Aralia* with its scrolly leaves that slice open into those much dissected ornamental displays of foliage? Incidentally, nobody quite knows what *Aralia* means. There is a word whose origin has been forgotten.

—o—

Speaking of names and thinking of potted plants which we now have on our window sills, I recall the time when we all spoke of *Geraniums.* Now, the catalogues and gardening experts, insist on calling them with their proper name: *Pelargonium,* using *Geranium* for the family and the various relatives of the crane's-bill kind. But when you analyse the names, they mean practically the same: *geranos* in Greek is *crane, pelargos* is *stork.* It is always amazing to me how *crane's bill* and *Storchschnabel* and similar words in other modern languages have behind them a tradition of thousands of years. What the early Greek noticed in the seed pods of these plants, was just as much noticed by the ancient Teuton or Saxon. Now why didn't one nation or another emphasize the leaf form, the color of the flower, or some other character? They all saw the distinguishing feature in the seed pod.

—o—

This number brings to our readers the first article from the pen of Dr. Pfeiffer, one of the foremost experts on organic farming and the leader of the Bio-Dynamic movement. This group has developed some special preparations of plant extracts with which they break down manures. The home of the movement is in Dornach, near Basel, Switzerland, and the guiding spirit is Rudolf Steiner, founder of

the Anthroposophic Society. Dr. Pfeiffer not only has a great scientific reputation, but also much varied practical experience with farming and gardening in many parts of the world, and we hope to have many articles from his able pen.

—o—

The *Nebraska Farmer* of April 7, 1945, had an editorial on R. I. Throckmorton, Head of the Agronomy Department at Kansas State College. The well-known scholar says that removing crop residues for a long period increases the weight of a cubic foot of soil from 65 pounds to 84 pounds. Not only does it take twice the power to pull a plow through soil of the greater density and heavier weight, but a soil without organics lacks in fertility. While Throckmorton estimates the direct fertilizer value of corn stalks as $2.00 an acre, the ultimate value is much greater. This is another reason why burning should become illegalized. Here the fertility of our land and the well-being of future generations is at stake.

—o—

"Two hundred standard eggs (24 oz. to the dozen) will weigh at least 25 lbs. If the hens are properly nourished, approximately 11% of this, or 2¾ lbs. will be mineral matter. So this 200-egg hen must, in the course of a year, digest, assimilate and deliver to you through her blood stream about half of her own weight of mineral matter," writes D. A. Carr in *Feedstuffs*, sent us by our subscriber Mr. Keim. This is quite an achievement, both of the breeder and of the hen. But I cannot help feeling that making milking machines out of cows, doping them with hormones and stimulants, making egg-laying machines out of hens, and looking at animals in general as though they were not living beings, but mechanisms that we can control at will, is unsound. It is perhaps very human to try to get more and more, but do we get *better* eggs and *better* milk when we "increase production" to such an extent? In 1920, the average hen layed 65 eggs, in 1938 106, and in 1943 140. If it is not good for the hen, and I am sure it isn't, how can it be good otherwise?

—o—

I am just thinking again of our *Gardener's Book Club*. With paper restrictions lifted, there is no longer any limit on membership. And while we had the earlier quota filled, we now can go on and make the knowledge of the specialist available to many more. There will be an outstanding book by Dr. Pfeiffer, a complete Herbal by Mr. Barlow, and many other books of value before the first year of the Gardener's Book Club comes to its successful close.

—o—

We are happy to have Dr. Pfeiffer now among our regular contributors. The well-known scientist holds a Doctor's degree in chemistry which enables him, of course, to ascertain for himself all about plant nutrition and soil fertility. Dr. Pfeiffer was in charge of the agricultural and gardening enterprise at Dornach, Switzerland, travelled far and wide over various parts of the globe and made many observations on plant growth, and gathered, as his article shows, first-hand experiences in Holland in bulb-growing.

For some twelve years he has managed and operated farms in this country, besides supervising the work of the Bio-Dynamic Association.

—o—

Different from Organic Gardeners, the bio-dynamic gardeners use specially prepared plant extracts for treating compost piles and living plants. We hope to have this method explained in a future article too. At the moment, our readers can get rich information in Dr. Pfeiffer's two books which we have advertised for many years. How to grow certain vegetables side by side to the mutual benefit of both is a very interesting topic. It is especially fitting to call attention to this in view of the *Interesting Letter* which reports about poppies and cutworms. Also in this issue.

Garden Calendar—November

Medium Temperate Zone: Freezes may be expected and storage problems concern the vegetable gardener. Some plants may be taken in the cellar, for instance, Whitloof chickory for winter greens. Pot chives and parsley for winter use. Mulch rhubarb plant, spade and topdress the garden.

This is time for planting roses and bulbs and many shrubs, as long as the soil is workable. Gooseberries are now cleaned out, other berries likewise. But canes can wait until spring. Loosen the ground under fruit trees. Shrubs for planting: Forsythia, Weigela, Kerria, Deutzia, Spiraea, etc.

Tender chrysanthemums need protection now. November is the important mulching month. The mulch is not to keep the plant warm, but to keep the sun away so that no thawing takes place which would crack the stems. Sweet peas can be planted out. Hardy annuals may be sown, Godetia, Clarkia, Gilia, Bachelor's Button, Poppy, Candituft, Larkspur, Monkshood. The latter germinates slowly.

Watering must be decreased, frames cleaned, water gardens emptied.

Subtropical Zone: Onions, onion sets, parsnip, endive, kohlrabi, and cabbages in general can be sown. Bulbs and annuals are put out. This cool period is the only one when stocks, wallflowers, mignonette, and other lovers of cool weather will succeed, also carnations under favorable conditions.

Old Rule: All Saints Day (1st November) is supposed to bring a "little summer". But it usually lasts only a few days.

Artificial Insemination

By SIR ALBERT HOWARD, C. I. E.

A letter to the New English Weekly

I SHOULD like to offer a suggestion by which a definite conclusion can be reached on the value of artificial insemination in live stock—a matter introduced in your issue of June 28th under the title "The Genetic Revolution". My suggestion is based on some thirty years' experience in actual plant breeding, which included a long period devoted to a study of the methods by which fertilization is brought about. Briefly stated, I found it did not pay to interfere with the methods of pollination laid down by Nature. As long as the investigator worked within the limits imposed by natural law, all went well, but the moment any attempt was made to work outside these laws trouble invariably followed. I will quote an example. The flowers of the cotton plant are pollinated in two ways—by pollen from the same plant and by pollen from other plants. Both self- and cross-pollination are the rule in this crop. But, if we prevent cross-pollination altogether and only allow self-pollination, a falling off in vigor becomes noticeable after some five or six years—the first signs of loss of reproductive power begin to show themselves.

In the artificial insemination of animals, the interference in natural law is as great, if not greater than in the self-fertilization of the cotton plant for reasons which need no explanation. Before artificial insemination was released from the shelter of the experiment stations a long-term trial should have been carried out. Two herds of the same breed should have been maintained side by side under similar conditions. One herd should have been bred by natural means, the other by means of artificial insemination on both sides—male and female. In some ten to twenty generations I am convinced that interesting differences would develop. The animals raised by artificial insemination would begin to show definite signs of loss of reproductive power. The practice of artificial insemination would then be relegated to the scrap heap: the investigators would have been taught the limits of their powers: the vigour of our live stock would have been preserved.

But nowhere can I find any evidence that such a commonsense test has been carried out, so that Nature herself could give a clear-cut verdict. Instead, all sorts of arguments have been advanced in support of this monstrous innovation, for the most part based on considerations of profit. But if, as is more than likely, this practice leads to species-erosion, these ephemeral profits will soon become a total loss.

The authorities concerned have, in my judgment, failed in their duty to safeguard our breeds of cattle. These breeds are a precious inheritance: they have been built up by the labours of many generations of farmers: the husbandmen of to-day may, of course, use them, but they are only trustees: they must, in

duty bound, hand these breeds on to the next generation in at least as good a conditions as they found them. If they fail in this duty, they are guilty of a serious breach of trust.

This principle of trusteeship applies to many other aspects of crop production and animal husbandry. It concerns the owners of land, the men who farm it, the land workers, and the urban population whose food is all produced by the earth's green carpet. Once this idea of trusteeship is welded into the make-up of every boy and every girl in our schools, and then woven into public opinion, the place of the farm and the garden and of our food supplies in our future affairs will need no argument. This task, of course, involves the relegation of the profit motive from the position of a short-sighted master into that of a useful servant. This is the great task now before us.

Stubbles And Grain Crops

IT IS DUE largely to the repute of *Plowman's Folly*, Faulkner's well-known book, and such other works on organic agriculture as Bromfield's *Pleasant Valley* and Cocannouer's *Trampling Out The Vintage* that this country has become mulch and sod-conscious. But the same process has gone on elsewhere. Professor Lysenko, famous academician and a leader in plant physiology in Russia, has just published his conclusions on growing winter rye in Siberia. The translation appeared in the *Journal of the American Society of Agronomy* in August 1945. The questions of weed control, moisture control, and soil aeration are discussed, but the result is: Sowing winter rye in the stubble of the spring crop is preferable to any other method under Siberian conditions.

Not Bread Alone

THE LIVING PARISH, published by the Pio Decimo Press in Saint Louis, Mo. carried an article in its June 1945 number, by David C. Dunne, in which is said: "It is particularly desirable that all our schools, seminaries, monasteries return to whole wheat bread. A friend, recently returned from a retreat at the Trappist Monastery in Kentucky sings a glowing paean of the life-giving properties of the whole wheat bread served there. It is his belief that this bread is largely responsible for the splendid health of these heroic men whose diet is otherwise rather restricted." Among the references cited is our own booklet *Natural Bread*.

Gardening In Modern China

By M. W. HILL

IN Organic Gardening for August 1945, you use an article by K. M. Gordon telling of his garden experiences in North China in 1904. Of course I cannot be sure of the accuracy of his observations at the time he writes about, but a far different picture prevailed in South China (Shanghai Hangchow section) from the early twenties on, when I lived there.

My rather extensive interest in this subject is due to the fact that in 1928, the Public Works Department of the Shanghai Municipal Council began work at last on the long planned Western Sewage Disposal Works and my husband was the engineer in charge. This project was to be one of the most vital and necessary steps in the Public Health Program for China. And until it was completed, there was no sanitary plumbing in any of the settlements in Shanghai, not even in the best European private homes, or in the world famous hotel, the Astor House.

The customary practice was to use a porcelain commode that was emptied by coolies about four or five times a day. This method of sewage disposal was of course a continued source of personal discomfort as well as a civic eyesore to say the least. But there were more serious implications involved. For this refuse was put in huge wooden carts trundled through the streets by coolies and emptied on to special boats that carried it via Soochow Creek or the Whangpoo River to the farms in the countryside where it was applied directly to the rows of growing plants or broadcast on the fields. In fifteen years residence in China, I never saw any attempt made to compost this sewage. Although the Chinese utilize everything possible as fertilizer, I never saw the sewage products mixed with anything. It was ALWAYS, in my observation, used "as is" and spread along rows of growing plants or broadcast directly on fields ready for planting depending on the season of the year.

The purpose of the long anticipated Sewage Disposal Works was not only to afford sanitary sewage disposal but also to so treat the sewage in process that it could not infect gardens, so great was the menace from its use for that purpose.

When the sewage project began my husband had supervision over the hundreds of Chinese workers. A small house, surrounded by a huge bamboo fence was built first for our living quarters on the twenty acre project so that he could be on hand for all emergencies. By the time the house was ready for occupancy, colorful asters and early chrysanthemums were growing profusely in our garden. The blossoms were enormous and the plants lush and bright, but we could have no vegetable garden. Yes these same fields that produced giant asters could and did also produce lettuce as large as cabbages, cabbages like watermelons, watermelons big enough for a Cinderella coach. BUT, and this is the most important point, it was because the ground had been fertilized with raw un-

treated sewage. And any vegetable grown thereon and eaten raw was a form of deadly poison at least to us "foreigners" for it teemed with the dreaded germ of amoebic dysentery ever present in the raw sewage.

I might mention here the great craving one has for fresh vegetables in the Orient. The truest luxury, the greatest present to give or receive was a head of lettuce which at times it was possible to buy from incoming American boats for about $1.50 a head. Served at a party, it provided food for the body and food for conservation as we savored every leaf. Our ideas of home centered around the fresh fruit and vegetables we longed for. I remember very well, on my first trip home, how I devoured fresh California tomatoes at every meal, three times a day, for my whole visit. This fresh food starvation is one of the greatest disadvantages of life in the Orient, but in China the first lesson the "foreigner" must learn is never to touch uncooked raw foods, for if he does, he is soon another homebound casualty with dysentery. It is true that the Chinese may have built up an immunity to this disease, but it has been at a cost of millions of casualties.

My reason for calling this to your attention is two-fold. First to point out that there is no way to "needle" vegetables and fruits and expect to receive quick growing attractive yet healthy products. You can not do it either with chemical fertilizer or with human excreta. Showy results may be obtained by application of chemical fertilizer or by human manure, yet neither provides the most essentially desired quality in a food which is healthfulness. Secondly we need much more research into the tenacity of germ life, amoebic dysentery, typhoid, cholera, etc. in the compost heap, their life cycle etc. before we attempt to use human excreta. We still have so much other valuable material here that we waste without composting. Let us try that first!

Editor's Note:

It may be well for us to state our position with regard to human wastes. Wherever they are used in remote regions or distant countries, trouble has arisen when the material was not composted. When the Rockefeller Institute sent Asa Chandler to India to study hookworm infection, carelessness with animal and human wastes was discovered to play an important part. When Paul Schumacher returned from his geological excursion in the near East, he attributed the bad state of health in Southern China to the prevailing use of human wastes. On the other hand, it is known that the healthy Hunzas of Northern India always compost their wastes. And Mr. Degener, the distinguished botanist of Hawaii, collaborator of the New York Botanical Garden, recently reported from his expedition to the Fiji Islands that the natives there would consider human wastes "plain filthy." In this country, we feel, there are so many untapped sources of plant fertility that resorting to human wastes will be unnecessary for a long time.

Organic Farming Unawares

By DR. JUAN AMON-WILKINS

Professor, Havana Medical Institute — Isle of Pines, Cuba.

ORGANIC FARMING is practiced by any number of people successfully unaware of its superior value and quality to the soil. I have found in my travels throughout the Carribean and Latin American area that people prefer organic farming and gardening to artificial or inorganic gardening. However, they can be induced to change to the modernistic trend of doing things more rapidly or by high-powered salesmanship.

Recently a patient began talking about crops, the dry weather following the last October hurricane, and finally that the Cuban government was giving fertilizer to the farmers to help them for the losses they had sustained, and to aid them in the rapid production of crops now that favorable rains are coming. He said, "However, I am not so very anxious to take any of this inorganic stuff". I asked him why, and he said because it would hamper the organic process that he has maintained for many years. This interested me, and I asked him if he had been reading the magazine Organic Gardening. But he said he had never heard of it. Then I asked him how he composted his vegetable matter, but he said he did no composting, that he merely throws the animal manure over the ground and lets it rot with the other vegetation. This he would hoe into the ground when making his beds for the planting of vegetables. His trees are mulched with all available vegetable matter. I asked him if he plowed, to which he replied, "I do no plowing."

I told him that I too used the organic system, but that I composted all the vegetable matter with manure (when we had it), wood ashes and lime. He said to me, "That is not organic fertilizer, that is vegetable fertilizer. What I use is animal manure, which is the refuse from the animal organism."

I replied that my composted material was organic too, and was better prepared than merely letting the animal matter lie around on the ground in the sun, wind and rain. He said, "No, what you use is just vegetable fertilizer."

I then explained to him how the bacteria disentigrate all the vegetable materials; the earthworms digest and excrete them, so that they become very minute substances, readily assimilated by the roots of the plants. That when acted upon by these organisms, this vegetable debris produces the best organic fertilizer. He comprehended the idea.

I further explained that the more complete the vegetable matter may be, in the chemical materials required to nourish various kinds of plants, the healthier are the plants; that under such conditions, plants are not preyed upon by various parasites, blight, etc., and that no insecticides are necessary, nor the costly apparatus for applying the insecticides. He agreed, then explained that, when he had used chemical fertilizers on a large scale, he was forever bothered with various plant diseases. He had to be always spraying; he never saw any earthworms around, nor did his

fruits and vegetables taste as good as they do now with organic fertilizers.

I asked him what made him change to the organic system. He said that he went broke trying to modernize his farm with all the scientific fertilizers, sprays, and machinery, but now he has very little overhead expenses, a little more physical work, but no financial worries.

I explained to him that these artificial fertilizers were composed of inorganic chemicals, like many drugs, which might stimulate action or growth, but were incomplete in their organic chemical materials. That most times, the chemicals are so powerful or potent that they kill bacteria, earthworms, etc. In the human body, they produce atrophy of nerves and ulceration of the digestive and circulatory membranes, so that even though the drug might apparently correct one disorder, it produces another. This same condition is produced in the soil and plants when chemical, inorganic fertilizers are used.

My patient said that he did not understand the difference between inorganic and organic farming before, that he did not know that this system or science existed, but he did know that manure was organic, and when mixed with vegetable matter and permitted to rot in the soil, his plants flourished. That the earthworms were more plentiful under such conditions, and he noticed where there were more earthworms, the plants were more healthful and the produce more delectable.

I gave him a copy of Organic Gardening and asked him to read it. Then I explained why I did not use drugs in my practice, because they act on the human body the same way as the chemical fertilizers on the soil; that the body becomes accustomed to the use of drugs, like the soil, and won't function without periodic drugging or chemical fertilizing, like the soil, but that when I furnish the body with organically-grown fruits and vegetables, and herbs, the blood stream is supplied with the natural chemicals or mineral salts and vitamins that are required to repair cells, glands, organs and the nervous system, and that this produces vibrant health, and the body functions normally and naturally, especially when other hygienic practices and proper rest are maintained.

His closing remarks were: "That is why I came to you, I heard them say you didn't use dope."

The Worm Plow Again

WE HAD a great number of inquiries on a plow described in *Business Week*, working on a new principle, the worm rather than the share. This plow would naturally have the advantages of the disk in addition, and if the worm were driven separately, could be even horsedrawn and yet permit thorough cultivation with the least outlay of labor. The model now announced may not contain all these features as yet, but those interested in it can find out from the manufacturers, *Graham-Paige Motors*, 8505 West Warren Avenue, Detroit, Michigan.

The Chicken-Dropping Pit

By J. I. RODALE

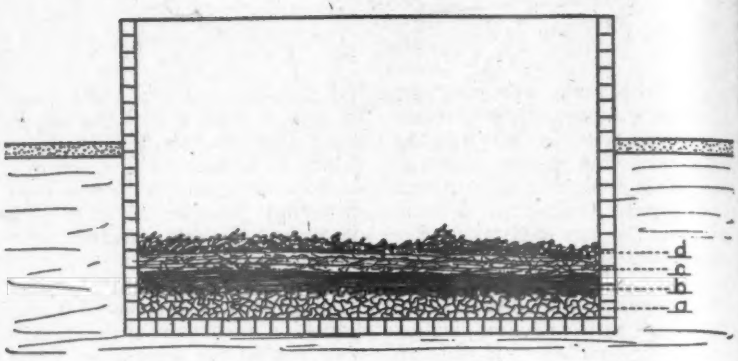
READERS may well ask "why should there be an article on chicken-dropping pits in a gardening magazine?" The answer is that it contains an interesting lesson about the action of bacteria in the soil, and shows the part they take in the maintenance of soil fertility and in the operation of a compost heap.

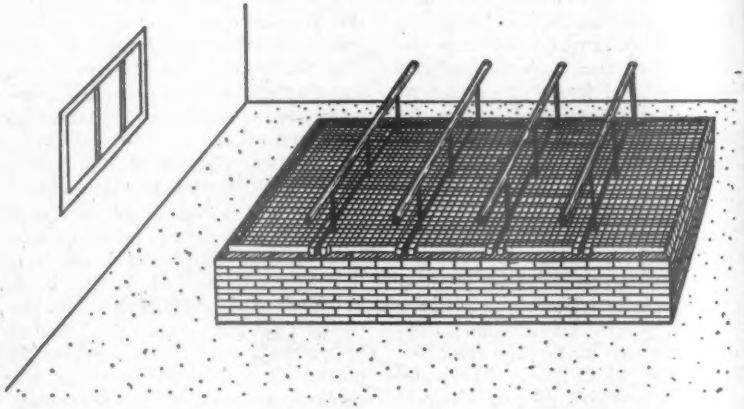
A few years ago we decided to experiment with the dropping-pit method of handling our chicken droppings. Chickens sleep on roosts that are about three feet off the ground and their droppings fall on boards directly under the roosts. It is a tedious chore to clean off the boards each week, to eliminate the unsavory poultry odor. Even where the cleaning job is regularly done there may be some smell. For a long time poultry authorities have recommended the use of dropping pits instead of boards to eliminate the labor of cleaning. The pits are shown in the illustrations. The only drawback here is that superphosphate had to be sprinkled in the pit from time to time to de-odorize the droppings and we would not use it as it is a strong chemical fertilizer.

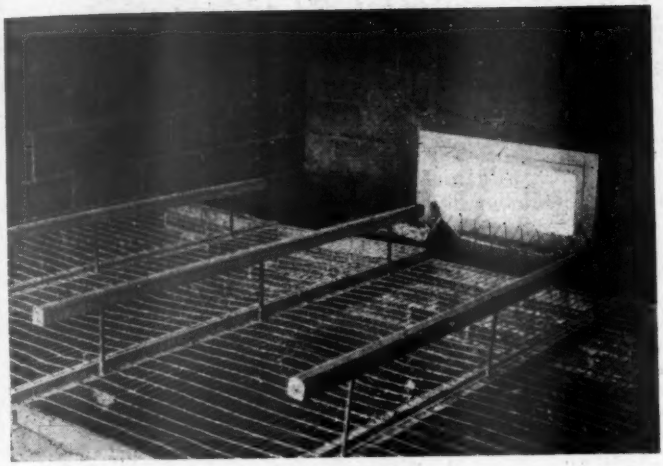
Our decision to build one of these pits was made when we received a copy of "Our Friend the Earthworm" written by Dr. George Sheffield Oliver of California, who described a method of using earthworms for breaking down the droppings and eliminating the odors. But it didn't quite work out under our climatic conditions. At about this time we discovered the power of old rotted manure in reducing odors in our steer-barn. When the manure in such a barn is not thoroughly cleaned out, the remaining residue is so rich in bacteria, that it acts as a deodorizing agent on the new steer droppings. The bacteria go to work on it and there is practically no odor.

We then reasoned that if we took such old manure and placed it as a culture on the bottom of the chicken dropping pit the same thing would happen. And it did. The odor of the chicken house is practically entirely eliminated. It serves other useful purposes. It saves labor, in that we clean the pit out only once in about six months. In addition the chicken droppings gradually rot in the pit, so that when it is cleaned out it is ready to be used on the land. Another advantage is that the chickens are healthier. It is known that the sharp poultry house odors cause respiratory diseases in the fowl.

The construction of the pit is shown in the diagrammatic drawing. The pit is dug out about 3 or 4 feet below the floor level. First a layer of stone is placed at the bottom for drainage (a). Then a layer of rich top-soil is placed (b). Between (b) and (c) a thin layer of old rotted manure or compost is placed as the culture. (c) is the chicken droppings. (d) represents a variation of the method, that of actually making a well-balanced compost in the pit. (d) is green matter which can be thrown in about once a week. A little earth and lime can be placed on top of







it so as to get the regular ingredients of a compost heap. Note that the wire mesh under the roosts (in the photograph) is made in sections, for ease in lifting them off to get at the material in the pit.

The droppings of the chickens, which include the liquid, are a very rich form of animal matter and make a wonderful compost. The conditions are perfect for making compost. The house is protected from drying winds, the bacteria in the pit have ideal conditions to work and, just as in a good compost heap, there should not be any odors, so in this pit-heap there will not be any.

For over a year we handled our pit just with the droppings, and without throwing in any green matter. It effectively controlled the odors. Visitors, who have been in other chicken houses, were amazed at the wholesome atmosphere. Following the compost method, however, we get a better final product.

In making a compost heap, one is impressed by the complete absence of objectionable odors. If there is any, then something must be wrong. Putrefaction may be taking place instead of fermentation. If the bacteria are given conditions on which they thrive, they will work nicely in breaking down the raw matter. They need especially air and a certain amount of moisture. If there is too much water and if the air is cut off, then the anaerobic bacteria and other undesirable organisms will come into action and you may have an unwelcome odor. If there is insufficient moisture and too much air, the composting process will not properly take place.

Study over all the instructions for making compost. There is a reason why they are so carefully specified. The chicken-dropping pit illustrates one aspect.

Farming Hand in Hand With Nature

From "COMPOST MAGAZINE" (New Zealand)

IN the Northern Transvaal near Duivelskloof lies a remarkable farm —Westfalia Estate—owned by a geologist, Dr. Hans Merensky, who in fourteen years has not only put ruined land into a state of productivity, but also restored springs and streams on the estate which had partially or wholly dried up. Dr. Merensky's sound and imaginative methods are described by Mr. E. M. Palmer in the "Farmers' Weekly" of Bloemfontein of January 24th, 1945.

Not more than forty years ago, Westfalia Estate was virgin land, but steam-ploughing up and down the slopes and monoculture of crops resulted in rapid destruction of the humus in the top soil followed by erosion. Much of the top soil had gone. Termites swarmed everywhere. Many of the once permanently running streams were dry or ran only after rain.

Making a Start

The first problem to be tackled was control of the termites. Hundreds of queens were dug out of the soil. Then numbers of eucalyptus saligna trees were planted, the leaves, twigs, and bark of which produced, after some years, a thick layer of humus, and under these moisture conditions the termites did not reappear.

Besides its value in humus formation, eucalyptus saligna rapidly forms a canopy and shades the soil beneath it. Dr. Merensky has paid particular attention to the vital necessity of protection from the sun for soil, water and animals. Orchard tree roots are mulched. Along the streams, Nature is allowed to provide a canopy of fern and indigenous bush with trees over all. Plantations of trees and a roofed kraal give shade for the cattle.

No More Erosion

By allowing this natural growth around springs and streams, little land has been lost to cultivation, while on the other hand the value of the farm as a whole has increased beyond measure. Dry water-courses or trickles of water have become strongly running streams, and the Ramadiepa River fed by springs on Westfalia, once not known as a river at all, now runs throughout the year. The natural vegetation, filtering and retaining water like a sponge, has made silting and erosion things of the past.

Lands are composted at the rate of 40 tons per morgen. All compostable material is carted to the cattle kraals for bedding and later piled into heaps and turned when necessary. In this way the manufacture of compost is fitted into normal farming routine with a minimum of cost and effort.

Dr. Merensky's citrus orchards provide an outstanding example of how poor soil may be built up to a state of productivity. On taking over the farm, experts advised him to scrap the trees: they were yellow and unhealthy; the soil was worn

out. He determined instead to re-create the land with manure and green-manure. Today, those same trees, healthy and flourishing, yield fruit with a sugar content well above Government standard. His 2500 avocados supply the Johannesburg market with good fruit the whole year round.

Human Health Benefits

Even more striking than these achievements in soil and water conservation and the renewed productivity of the land is the improvement in the physical condition of the Westfalia native labourers, whose health and contentment have contributed to the success of the whole undertaking. Their lands are contoured; the manure from their cattle is given back to the soil; good seed is supplied for their crops, and they have learnt the value of a rotation with cowpeas. Irrigation is permitted only once in three years on the same block of land, and the plough is only used when the soil is too hard for cultivators. Recently, after vaccinating 200 natives on the Westfalia Estate, the local doctor wrote:

"I was struck by the wonderful physique and good average health of the natives. I have vaccinated thousands of natives this season at various places, and always found the incidence of certain diseases exceptionally high. The contrast was striking at Westfalia, where I did not see a single case of the diseases common among natives."

What better testimony could Dr. Merensky have to the soundness of his policy of working in harmony with Mother Earth and to the value of his example in promoting health in soil, crops, live stock and men?

Reader's Correspondence

Send stamped self-addressed envelope for reply.

SPRAYING?

Q. I have in my yard some very nice oak trees and each year there are numerous ends of the branches cut off by a small white worm, this year being very much heavier than usual and I am worried for this may be something that needs drastic attention. Will you please advise what your suggestions are. The worm cuts off the tender end of the branches and you find them in the center of the branch after it has fallen.

Harry G. Hempstead,
St. Charles, Ill.

A. Where no food-growing plants are involved but it is merely a matter of ornamental trees or shrubs we are not adverse to spraying. As a rule, ornamental trees are not fertilized or grown organically, and would therefore be subject to many pests; especially since such trees and shrubs are frequently planted in regions far away from their original home, or on soils on which they would normally not grow.

We would advise, therefore, that you get some Rotenone spray or whatever else your nearest seedsman has available against leaf eat-

ing insects. You can probably get some experts with equipment who will apply the proper spray.

—o—

FREEZING

Q. For the past couple of months I have been collecting greens from our local Grower's Market and piling them on my lot. *Does the freezing of this material deteriorate its value as compost?*

Geo. G. Hoover,
Williamsport, Pa.

A. Freezing is a process which occurs in nature and is recognized as most helpful in breaking up the soil minerals and organic matter. No deterioration need be expected.

—o—

CHRYSANTHEMUMS

Q. Out here in Calif. we have to cover our chrysanthemums to keep off the hot sun, in September; as cheese cloth is not to be had could I use blackout paper? Its a heavy black paper not as heavy as tar paper, I have a lot of it.

P. Rolfe,
Los Angeles, Calif.

A. Black paper should not be used, because it absorbs heat. The darker a substance is the more heat it will absorb. White is the perfect insulator as it retards the heat rays. The same holds true in regard to soil. As you keep on enriching your soil with compost it turns darker, and the darker it gets the more heat it can absorb. It has been determined that the difference in temperature between the two extremes of soil color is as much as 8%.

I would also caution against the use of paper for your purpose as it mildews easily and may create unfavorable conditions for your chrysanthemums—white cloth is the best.

—o—

HEATING OF COMPOST

Q. I tried making my first compost heap early in August using, however, old instead of new manure. No heating or appreciable sinking has taken place. What do I do now? Obviously it is hard to remake by separating the ingredients as applied.

William H. Linquist,
Wooddale, Illinois.

A. Where old manure is used, the heating usually does not take place as it does when fresh animal matter is employed. You state that it would be difficult to remake the heap by separating the ingredients; that is, the green matter and the manure. But this is not necessary. There are two different methods of making composts. First, there is the ordinary way, by which the ingredients are charged into it in layers, that is, six inches of green matter and then two inches of manure. In this case the heap must be turned twice. There is another method where it is desired to eliminate one turn. In this case the green matter and manure are thoroughly mixed together. Then the earth and ground limestone are applied. The layers, (a combination of animal matter and greenstuffs would be 8 inches).

Since your materials are already so mixed, I would then use it to make a new heap, adding some new fresh manure or some dried blood.

There are various factors necessary to insure the proper heating

up. First, relatively fresh manure should be used. Two other factors are, poor aeration and too dry a condition.

—o—

RADIUM

Q. Captain H. R. Zimmer stated: Radon is being commercially used to promote vegetable life, making sturdier, healthier plants and greatly increasing their production. When used with flowering plants, the blossoms are more numerous, the colors more beautiful and the fragrance more abundant. Vegetable and fruit production has been increased from sixty to two hundred per cent, and the food values proportionately increased in the eatables.

One very striking improvement noted is an eighteen per cent increase in the sugar content of tomatoes. Fruit trees have been made healthy and produce greater quantities of better fruit; field crops have been increased in volume and their quality much improved. All forms of plant life when subjected to treatment with radon, produce earlier crops with less attention and care; in fact, radon acts very similarly to increased sunlight and is just as acceptable to plant life as are the rays from the sun. It has been referred to by many floricultural and horticultural experts as concentrated sunlight. Have you anything on the subject?

A. S. Kirkpatrick,
Albuquerque, N. M.

A. We are very critical of applying radium. Radium is used for inhibiting cell division which explains its value in treating cancer and sterilizing people. Nobody knows, but it is anyone's guess what radium might do if absorbed in organic form as food. Who knows if it will not have a sterilizing effect? Besides our idea is to apply a complete balanced plant food in form of compost instead of this or that element and we should wait for further developments. In this matter I would rather have "concentrated" sunlight myself.

FOR SALE

CAR LOAD RUHM 30%
PHOSPHATE ROCK (Pulverized)

CAR LOAD DOLOMITE
LIMESTONE

CAR LOAD GRANULATED SALT

SHATTUCK
317 Third Ave. — Pittsburgh, Pa.

Learn **LANDSCAPE GARDENING**

A thorough interesting and constructive HOME TRAINING for both those who wish to become LANDSCAPERS, DESIGNERS, GARDENERS, and those who wish to learn for their OWN USE AND PLEASURE. Enroll now! Course No. 1 for home gardeners. No. 2 for professional work. Write

NATIONAL LANDSCAPE INSTITUTE
Dept. G-11, 756 S. Bdwy., Los Angeles 14, Calif.

EAT SIMPLE FARM PRODUCTS
IF
YOU WANT SIMPLE FARM HEALTH

3—1½ packages Nu-Meal (a hot cereal made of 5 grains)	$1.00
3 lb. "Ready to Eat" Nu-Meal Cereal	1.00
4 lb. roasted (Flint) corn meal	1.00
3 lb. roasted edible soybeans (roasted without oil or fats)	1.00
8 lb. raw edible soybeans (Bansi) (can be used for sprouting, cooking, roasting, etc.)	1.00
2 lb. Sunflower Seed	1.00
Combination of all six	5.00

Small orders will be accepted.
Add 5c per lb. for points west of Mississippi.
Express and parcel post charges paid.
Above items grown without chemical fertilizers or poisonous sprays, and sent from farm where grown.

NU-MEAL MILL
Apple Creek, Ohio

COST AND COMPOSITION OF COMPOST

Q. After reading "Compost and How to Make It", a copy of which you so kindly sent me, I wondered about the practicability of making compost by the Indore method for a commercial nursery. The answer depends on two factors. (a) The percentage of organic material and plant nutrients as compared with an equal volume of farmyard manure or natural humus, and (b) its cost per unit of volume compared with animal manure or natural humus.

As a basis for such comparisons, it will be of great help to know the results of any analyses you have made of the percentage of organic content and the percentages of available nitrogen, phosphorus, potash and other elements necessary for plant growth, and also any records you may have kept which would enable us to approximate the number of man hours required for the production of a cubic yard of finished compost. I realize that conditions vary to the extent that there can be no definite answers to either of the above questions. However, such information as you have might indicate a range within which results could be expected as to these factors.

I should also be interested to know what your experience has been in using *peat moss* in the compost pile, and especially *coarse peat which* has been used as litter in a poultry house containing a considerable proportion of chicken manure. Will composting break down the coarse peat into easily workable material?

Cpl. Hewlett W. Lewis,
c/o P. M., N. Y.

A. On our last compost heap we found that one man working 9 hours

EARTHWORMS
NECESSARY FOR FINE GARDENS
Write for folder

OHIO EARTHWORM FARM
Worthington, Ohio.

DOMESTICATED EARTHWORMS . . . For biological soil-building
Send postcard for a Valuable FREE Bulletin, with review of my book on "EARTHWORMS: Their Intensive Propagation and Use."
DR. THOS. J. BARRETT,
Earthmaster Farms, Box B-3,
Roscoe, Calif.

Gain Financial Independence. "SECURITY ACRES" Sensational New Book tells how to create a fine income in your own back yard, a City lot, or a Five Acre plot. Not ONE but scores of ways to make money out of doors. Nothing else like this book on the market today. Send $1.00 bill for your copy today. Your money back if not satisfied. (Free Booklet "Money Grows on Trees" with each order).
Lightning Speed Mfg. Co., P. O. Box 115X.
Streator, Illinois.

THE COMPOST GARDENER
By F. C. King, with a foreword by Sir Albert Howard
An experienced old English gardener tells of his method of raising food crops by the organic method. The book is so revealing about the English gardening methods that we imported it for the benefit of compost and health-conscious America. Cardboard covers.
$1.50 Postpaid.
ORGANIC GARDENING — Emmaus, Pa.

Subscription To
ORGANIC GARDENING
1 Year (12 issues)
$2.00
ORGANIC GARDENING
Emmaus, Pa.

TREE RIPENED FRUIT
Grown "Organically". No commercial fertilizer, sprays or gas treatment.
Bushel of Oranges or Grapefruit or Mixed
$2.95 F. O. B. Tampa, Fla.
(Add 35c Pt., 60c for Qt. Florida Honey packed in fruit)
Mixed sizes as picked from tree—no washing—just a bushel of fine flavored naturally grown fruit from my own grove. Supply limited.
E. E. GARLITS
Box 46G Seffner, Florida

made 6 cubic yards of compost, with the aid of a dump truck. This was the making of the heap, not the turning. Compost contains usually 1 to 1.2% of nitrogen, which is less than manure, about 1% of phosphate, which is a little less than manure, and about half the amount of potash of manure. On the other hand it also contains considerable amounts of trace minerals and growth hormones and, if properly supplemented with rock phosphate (where the soil is known to be deficient, or to have been badly abused), furnishes a complete fertilizer.

While manure taxes the soil, which must first digest it, compost is ready-made plant food. The cost for us is very small because we have great amounts of manure on the farm and because we can utilize all sorts of green matter from a large place. It would, therefore, not be fair to use that as a basis for your computation, but since you probably would first experiment with it, you could easily keep a sheet and see whether you could produce compost cheaply enough.

Peat with poultry droppings is very suitable for composting provided you add sufficient other material, especially green matter and sprinklings of lime because peat is usually acid and you want a more neutral compost.

A CORRECTION

The picture in the recently published *Gardening Device* brought us much comment, not because it was good, but because it was wrong. Needless to say, Lt. Commander MacKay made the proper hitch and we did too. Otherwise the log would have slipped out. The mistake will be corrected. Until then, don't use our hitch—there's a serious hitch to it. A correct drawing will appear shortly.

STONE GROUND GRAINS

GREAT VALLEY MILLS

PAOLI, PA. EST. 1710

NATURAL Whole Grains and Cereals ground into FLOURS and Meals on our Water Driven French Buhr Stones. Send for FREE list of products.

ORGANIC CORN MEAL

5 lbs. of organically raised corn meal for 25c per lb. (add 5c per lb. for points west of the Mississippi).

GET YOUR VITAMINS DIRECT from NATURE

According to standard authorities, wheat germ contains vitamins A, B, E and G.

$1.00 BUYS ANY ONE OF THESE PARCEL POST DELIVERED:

3 lbs. plain wheat germ
or
3 lbs. caramelized wheat germ
or
60 perles (2 months supply) wheat germ oil.

GREAT VALLEY MILLS

PAOLI, PA.

GREAT VALLEY MILLS, Dept. O. G., Paoli, Pa.

Please find enclosed $..... Send..... wheat germ or ..... caromelized wheat germ or ..... Perles wheat germ oil.

Name .....

Address .....

Do You Suffer TOOTH DECAY?

Then You Lack Fluorine In Your Diet

Newest Researches show that most soils and foods today are very deficient in Fluorine, and that FLUORINE DEFICIENCY is the cause of dental decay. In Deaf Smith County, Texas, where the soil is rich in Fluorine, **tooth decay is unknown.**

BONE FLOUR is the most reliable source of Organic Fluorine, an element lacking in most modern vegetables and fruits. Researches at Worcester State Hospital have shown that by adding Fluorine to diet in the form of BONE FLOUR, **tooth decay can be halted.** So if you suffer from dental caries . . . if you desire strong, sound and healthy teeth, enrich your diet with Fluorine by the use of BONE FLOUR. 40 caps. $1.00; 75 caps. $1.50; 150 caps. $2.50 8-oz. $2.50; 16-oz. $4.00. Postpaid. Generous discount allowance to the profession and Dealers.

Free literature and descriptive Price List on Request.

BIOCHEMIC FOOD PRODUCTS,
1926 W. Railroad St.,
Loupurex, Penna. Dept. O. G.

Does Wheat Germ or Sunflower Seed Have More Vitamin B?

YOU WILL FIND the answer to this important nutritional question in SUNFLOWER SEED—THE MIRACLE FOOD, by J. I. Rodale. Sunflower seeds cured several ailments! Medical authority has since supported Mr. Rodale's startling discovery. Read the dramatic story in this profusely illustrated and beautifully printed book, No. 5 in THE GARDENER'S BOOK CLUB.

Books previously issued are:

1. THE FRUIT ORCHARD, much material on apple and citrus trees, valuable rare information on sports, pollination, and tree growth.

2. QUESTIONS & ANSWERS ON COMPOST, an indispensable guide to the gardener, full of varied detail from correspondence with thousands of gardeners.

3. LEAVES AND WHAT THEY DO, by Dr. Meyer. How to propagate plants by leaf cuttings, what chemicals occur in leaves, are the leaves the source of all our energy, how do the leaves work?

4. ANIMALS AND THE GARDENER, by Professor R. Headstrom. This charming, well illustrated book tells you of friends and enemies in the animal kingdom. Have you watched earthworms in winter quarters? What shall we do with skunks and woodchucks?

These and seven more books by well-known writers and foremost experts in the gardening fields, will be yours for only $3.00 a year. You can build up a splendid garden library at very low cost. You can keep in touch with leading gardening writers. You will find professional illustrations that can help you in recognizing plants. Most of the material has never before been published. If you wanted this information elsewhere, you would have to seek in many volumes. Here you get up-to-date material and—a pleasant surprise every month.

We proudly announce a forthcoming booklet by the leader of the Bio-Dynamic movement, the celebrated Dr. Pfeiffer, on WEEDS AND THEIR LANGUAGE. You will be surprised what weeds can tell you about your soil. There are TWELVE such books.

The Gardener's Book Club,
Dept. O. Emmaus, Pa.

Please enroll me as a member. I enclose $3.00 and wish to obtain TWELVE MONTHLY ISSUES of well illustrated, expertly written garden books. Send the numbers so far issued IMMEDIATELY!

Name .....

Address .....

.....

City .....

State .....

ORGANIC GARDENING
Emmaus, Pa.

AN AGRICULTURAL TESTAMENT

Sir Albert Howard
C.I.E., M.A.

By Sir Albert Howard, C.I.E., M.A., Formerly Director, Institute of Plant Industry, Indore, and Agricultural Adviser to Central India and Rajputana.

This is a remarkable book published by the conservative Oxford University Press. It gives the complete history of the Sir Albert Howard method of making compost. It describes the events in the West Indies and in India that led up to this epoch-making discovery. After reading this amazing book, if it does not thoroughly convince you that the organic way is the best, your money will be cheerfully refunded. Many gardeners date their conversion to the ORGANIC METHOD from the time of reading this Testament.

This is the recognized standard text book for gardeners and farmers who wish to change from the use of ordinary chemicals to home-made organic fertilizer. Howard has forty years of active experience in the field of organic fertilizers and is the accepted leading authority on the subject.

We have arranged to print the book in the United States and have been able to reduce the price to $3.50 POSTPAID. — Canada and Foreign 35c extra.

Organic Gardening — Emmaus, Pa.

Pleasant Valley

By Louis Bromfield

When the war came, this famous author acquired three run-down Ohio farms. Here he tells us what he found, what the former owners did with their land and their lives, and what the Bromfield family and their helpers made of it. There are many interesting characters, plenty of humor, much of wisdom in this book.

A DRAMATIC STORY, WELL TOLD, BEAUTIFULLY ILLUSTRATED.

All Organic Gardeners WILL LOVE IT.

$3.00 Postpaid

Trampling Out The Vintage

By Joseph A. Cocannouer

A remarkable book written by a teacher of agriculture who describes farming and gardening in backyard sections of Oklahoma as well as in China and the Philippines. This book will be read with sustained interest by COMPOSTERS. $2.75 Postpaid.

1001 GARDEN QUESTIONS ANSWERED
By Alfred C. Hottes
388 pages. 160 illus. $2.50
An amazing collection of useful information for the amateur gardener wishing to plan and manage his own home grounds.

BOOK OF ANNUALS. By Alfred C. Hottes
180 pages. 158 illus. $1.50
The author opens up many new possibilities to garden makers in this book, which is exceedingly complete, and all in all is a most useful manual dealing with annual flowers.

Organic Gardening — Emmaus, Pa.

O 1 46 1YR C702
MRS JAMES INGLIS
2301 HIGHLAND ROAD
ANN ARBOR MICH

The book organic gardeners have been waiting for

Pay Dirt

Farming and Gardening with Composts

by J. I. Rodale

Editor of *Organic Gardening*

with an Introduction by Sir Albert Howard

$3.00

PAY DIRT was chosen as the title of this book because it best expresses the results of composts in bringing soils to high fertility, profit for the farmer, and health to the consumer of farm and garden products. . . . Readers of *Organic Gardening* know at least *some* of the values of farming with composts. *PAY DIRT* brings you up-to-date on the latest scientific knowledge about composts, and their use, from all corners of the world, from the laboratories of leading soil biologists to the every-day experience on farms and in gardens. *PAY DIRT* is most important reading for every gardener, no matter whether you cultivate a small back-yard patch or a farm of large acreage.

PAY DIRT discusses all phases of farming and gardening—the bacteriological life of the soil, the value of earthworms, the theory and making of composts, "land-mining" with chemical fertilizers and by monoculture, erosion and its control, the prevention of animal disease, insect pest control without poison sprays, mulches, healthy plants and how to grow them, orchard practice, food for health, and many other problems.

If you already garden with composts, you will want *PAY DIRT* for its full fund of information. If you are not gardening with composts, but are combatting nature the hard way, "with head bloody but unbowed" then *PAY DIRT* will be a great revelation to you. **$3.00**

The Devin-Adair Company Publishers New York

Pre-publication Offer:

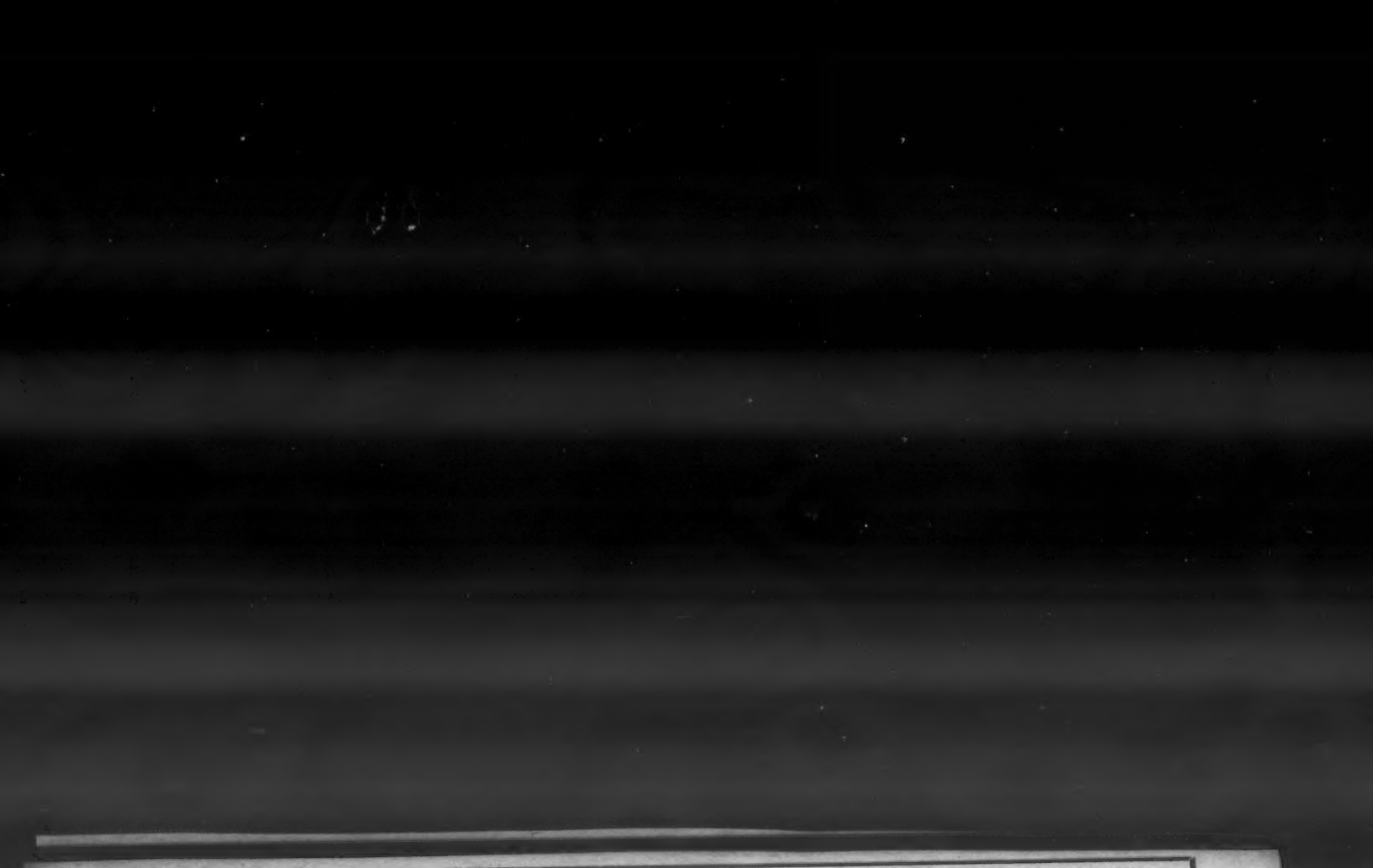
The author of PAY DIRT, J. I. Rodale, has agreed to autograph all copies ordered by readers of *Organic Gardening.*

The Devin-Adair Co.
23 East 26th Street
New York 10, N. Y.

Gentlemen: Enclosed please find $——— for which send me ——— copies of Rodale's *PAY DIRT,* autographed.

Name .....

Address .....

.....

Send order direct to The Devin-Adair Co.